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THESIS

AN INVESTIGATION INTO THE NAVY PUBLIC WORKS
CENTERS SPECIFIC WORK SERVICE PROCESSING
PROBLEMS

BY

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December 1980

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The survey results are presented relative to the specific work processing steps and a number of conclusions are made such as the need for enhanced customer liaison, more accurate scheduling, better utilization of manpower, and workload management. The discussion identifies factors which must be considered when addressing specific work problems, and suggests that more detailed study be conducted in certain areas.

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An Investigation into the Navy Public Works Centers
Specific Work Service Processing Problems

by

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

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I. INTRODUCTION

A. PUBLIC WORKS SUPPORT

The United States Navy (U.S. Navy) with her ships and aircraft commonly called the "Fleet" operating all over the world, requires many elements of support. One of those elements is public works. Wherever there is a land based organization, some degree of public works support exists. This is true for large naval ports like San Diego, California, or small outposts like McMurdo, Antarctica.

In the U. S. Navy, the term "public works" refers to physical structures, real estate, vehicles, and a multitude of services relating to these items. These public works services include: construction, alteration, maintenance, and repair of buildings and structures; operation and maintenance of transportation equipment and systems; generation and distribution of utilities; facility planning and engineering; real estate planning, acquisition, and disposal; and a variety of base operating services from custodial to dredging.¹

As depicted in Figure 1, public works support is provided by two types of entities;² the Public Works Department (PWD), and the Public Works Center (PWC). The PWD is part of the organization it serves, whereas a PWC is a separate organization serving a geographical area. PWCs resulted from the consolidation of two or more PWDs into a single organization. There are nine PWCs

located in areas where there are large concentrations of naval activities. Consequently, the small number of PWCs serve a large portion of the Navy's total public works requirements.

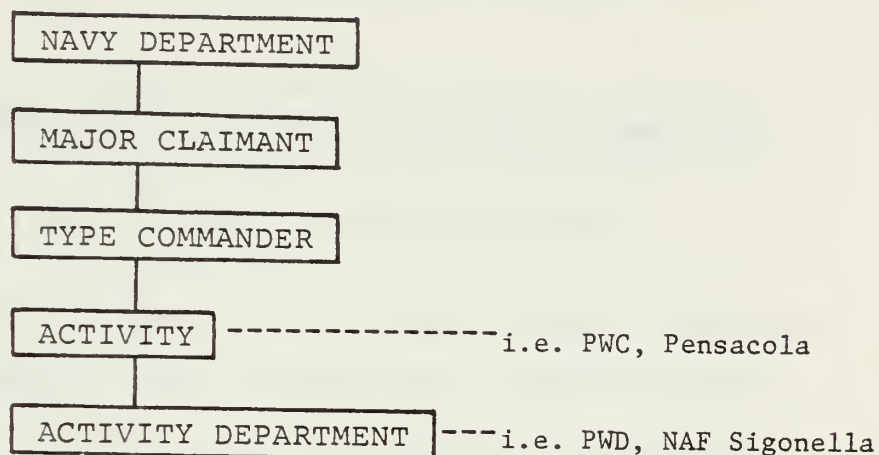


FIGURE 1. NAVY ORGANIZATIONAL HIERARCHY.

PWCs provide services to over 2,000 local activity customer commands. In fiscal year 1979, PWCs provided \$519 million worth of service. This amounts to approximately one-third of the total U. S. Navy public works expenditures. PWCs employ about 11,000 civilian personnel and 20 percent of the Navy Civil Engineer Corps Officers assigned to public works.

B. SPECIFIC WORK; AN AREA OF PUBLIC WORKS SUPPORT

Specific work is defined as any one on time maintenance, repair, alteration, or construction project greater than 80 manhours of effort.³ It is one of the functional and accounting classifications for the services offered by PWCs; others include emergency-service, minor, engineering and planning, recurring, predetermined, maintenance service contracts, utilities, and transportation.

Specific work, as shown in Figure 2, progresses through the processing steps of estimating, engineering, planning, material procurement, and execution. Almost all of these steps are scheduled, and the execution can be supplemented with contracts.

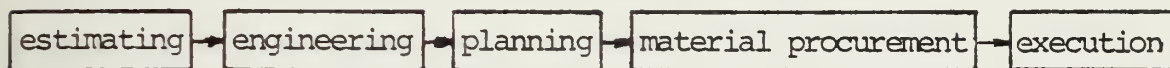


FIGURE 2. SPECIFIC WORK PROCESSING STEPS

The characteristics of specific work are varied. Although 80 manhours is the minimum level, there is no upper boundary, and many jobs require several thousand manhours. Work input and funding is at the discretion of the customer and are not constant throughout the fiscal year. Material requirements can range from over-the-counter items with no lead time to sophisticated electrical and mechanical systems mandating many months for delivery. Customer attention to work progress and quality is always present since these jobs are highly visible, cost many dollars, and usually affect a unit's mission in some manner.

PWC managers have many difficulties in providing timely specific work which meets the needs of the customers and the U. S. Navy. An article in 1968 stated that "response to customer requests is PWCs biggest problem." [1] Based upon the author's experience at one PWC, this problem continues to exist. Because of this problem, there is a need to identify and assess these difficulties.

C. OBJECTIVE

During a recent military tour of duty at a PWC, the author noted that the customers generally considered specific work accomplishment to be too slow and unresponsive. The author and other managers spent much of their time trying to improve specific work processing, but with no appreciable progress. Studies and investigations identified response problems and reasonably effective corrective solutions. Implementation of proposed solutions produced no real positive improvement in processing and executing specific work; therefore, the system continued to be unresponsive. This thesis looks at specific work processing problems relative to meeting PWC goals. Its main objective is to identify and analyze PWC management problems in regard to specific work processing. This thesis reviews the whole specific work process which is complex involving many people, actions and much time. The results are general and broad in nature, not specific and detailed. The author's intent is not to provide a means to correct noted specific work processing problems, but to provide an initial study from which future students may address, improve and expand the more detailed aspects of providing specific work in a time frame more acceptable to the customer.

D. APPROACH AND METHODOLOGY

To determine if other PWC's were experiencing similar specific work processing problems, questionnaires were developed and sent to all PWCs except one. The exception was PWC San Francisco Bay

where managers were used as the test or control group to define, refine, and improve the questionnaires. At the same time, questionnaires were also sent to the PWCs major customers. Both of these questionnaires were analyzed to identify problem areas with specific work processing and to compare customer and PWC manager answers for certain questions.

In addition, in-depth interviews were conducted with the managers at PWC, San Francisco. These interviews allowed a discussion of the various questions and points not permitted with a questionnaire. The author's experience and personal observations during the last four and one-half years at a PWC provided an additional source of information.

Utilizing gathered data, the PWC management control process was analyzed using the systems technique. This meant looking at the whole specific work process within its conceptual framework and in relation to its objectives. The problems noted in the survey are presented and discussed relative to general management concepts.

E. THESIS SUMMARY

Chapter II provides background information on PWCs and specific work. The origin, growth, concept, mission, and organization of PWCs are discussed. Their operating environment, various services, plus the accounting and management systems are described. Specific work is discussed in detail, as well as the processing system.

Chapter III reviews the questionnaires sent to the PWCs and also those sent to the major customers. The answers of the returned questionnaires are presented, discussed, compared and analyzed. Differences in the customers and PWC managers perceptions are highlighted. Problems of specific work processing are identified.

Chapter IV summarizes and integrates the information of the previous chapters. Key issues of specific work processing are discussed in regards to problems and management actions. Specific conclusions are made and areas for further investigation are identified.

II. BACKGROUND

A. INTRODUCTION

This chapter provides the background information necessary for a thorough understanding of the concept of specific work. The reader must understand the nature of specific work, its processes, and operating environment in order to understand the discussion of problems associated with it. Various subjects relating to specific work are covered which will give the reader a full grasp of this Public Works Center (PWC) service function.

This chapter addresses the topics of PWCs, specific work, and the PWC management systems. The development of PWCs, their concept and the consolidation process are explained. The PWC organization and mission are described, and the full range of services offered are discussed. Specific work characteristics and workflow as well as several key features such as priorities, scheduling, contracting, funding, backlog, and customer actions are presented. Finally, management systems are described and related to specific work.

The information presented is broad and general in nature, and is, to a great extent, characteristic of all PWCs. Where applicable, the information relates to standardized systems and procedures developed by higher authority; the Naval Facilities Engineering Command (NAVFACENGCOM). In the

absence of such uniform guidance, the information is based upon discussions and interviews with knowledgeable personnel and the author's experience. As a result, some of the information may or may not match that of a particular PWC location. The author does not attempt to address local variations produced from differing site conditions, or the degree of implementation of the standard systems or procedures.

B. DEVELOPMENT OF PUBLIC WORKS CENTERS

PWCs originated as a change to an existing method of performing public works services. They did not originate as a new entity with a new program. Their development has been gradual over the span of three decades.

During World War II, the Naval Shore Establishment had greatly expanded to meet the support and logistic requirements of the operating fleet. [2] With the war over, many of the support functions were excess to the postwar level of operations. The wartime facilities had to be reduced to a peacetime scale. As the scaling down process began, the United States Navy looked for means to reduce redundant support services without jeopardizing its defense posture. The objective was to reduce unnecessary support services while maintaining the capability to meet future defense needs. In an area with a high concentration of naval activities, each with its own Public Works Department (PWD), the consolidation of public works organizations into a single command was a means

to achieve the desired objective. The consolidation eliminated redundant and excess capacity while achieving economies of scale. The centralized operation had greater flexibility to expand to meet future requirements and defense needs.

The Norfolk, Virginia area was the starting point. The first PWC was established on 15 June 1948, at the Naval Base, Norfolk. Not all of the Norfolk activities took part in the consolidation action. However, the consolidation did combine several local activities' PWDs into one large organization. It was not until the early 1960s that the remaining Norfolk activities consolidated with PWC, Norfolk.

Since the first consolidation in 1948, there has been a continuing effort to consolidate public works functions in geographical areas with concentrated naval activities. PWCs were established at the following locations: Guam, Mariana Islands (September, 1949); Subic Bay, Philippines (July, 1953); Pearl Harbor, Hawaii (July, 1954); Guantanamo Bay, Cuba (August, 1956); Newport, Rhode Island (April, 1958); San Diego, California (July, 1962); Pensacola, Florida (July, 1962); Yokosuka, Japan (July, 1965); Great Lakes, Illinois (July, 1965); and Oakland, California (June, 1974). [3] The Oakland PWC, serving the San Francisco Bay area, was the first consolidation which incorporated a major non-Navy installation; the Oakland Army Base.

Throughout the years, other locations have been studied for the feasibility of consolidating public works functions.

Some of the locations studied were: Port Hueneme and Point Mugu, California; the Washington D.C. area; Jacksonville, Florida; and Keywest, Florida. However, due to various reasons such as command control, independence of functions, and lack of cost savings, these consolidations were never approved.

As of the writing of this thesis, there are nine PWCs located in the following areas; Norfolk, Virginia; Pensacola, Florida; Great Lakes, Illinois; San Diego, California; Oakland, California; Pearl Harbor, Hawaii; Guam, Mariana Islands; Subic Bay, Philippines; and Yokosuka, Japan. The PWCs at Newport, Rhode Island and Guantanamo Bay, Cuba have been disestablished due to the reduction of the U. S. Navy level of operations.

C. THE PUBLIC WORKS CENTER CONCEPT

A driving force behind consolidation action is economies of scale. Economies of scale is defined as the reduction of unit costs of production as the size of a plant is increased [4]. Economies of scale also means decreases in an organization's longrun average costs as the size of the plant is increased. Those factors which give rise to economies of scale are: greater specialization of resources; more efficient utilization of equipment; reduced unit costs of input; opportunities of economical utilization of by-products; and growth of auxiliary facilities.[5]

The increased size of plant and operations is achieved with the consolidation of two or more smaller organizations (PWDs) into one large organization (PWC). Figure 3 portrays the consolidation process. The action combines resources such as people, facilities, tools, equipment, and vehicles.

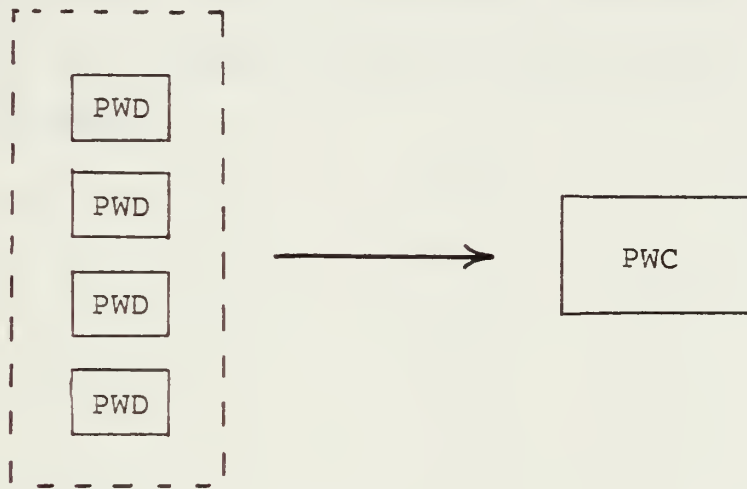


FIGURE 3. PWC CONSOLIDATION ACTION.

It also combines the input and outputs; inputs being requested services and outputs being the completed service. Utilizing the resources, the PWC performs the necessary action to transform the inputs into outputs. Simplistically, the process is graphically shown in Figure 4.

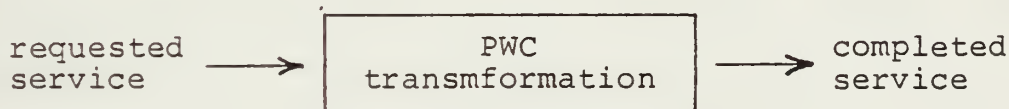


FIGURE 4. THE PWC PROCESS.

The consolidation of public works resources resulting in economies of scale means that the combined resources are greater than that necessary to accomplish the combined workload. A smaller amount of resources is required for this combined workload; so operating costs are reduced. This in turn means fewer tools and equipment, vehicles, facilities, and people. [6] Figure 5 depicts this process. Each item will be discussed.

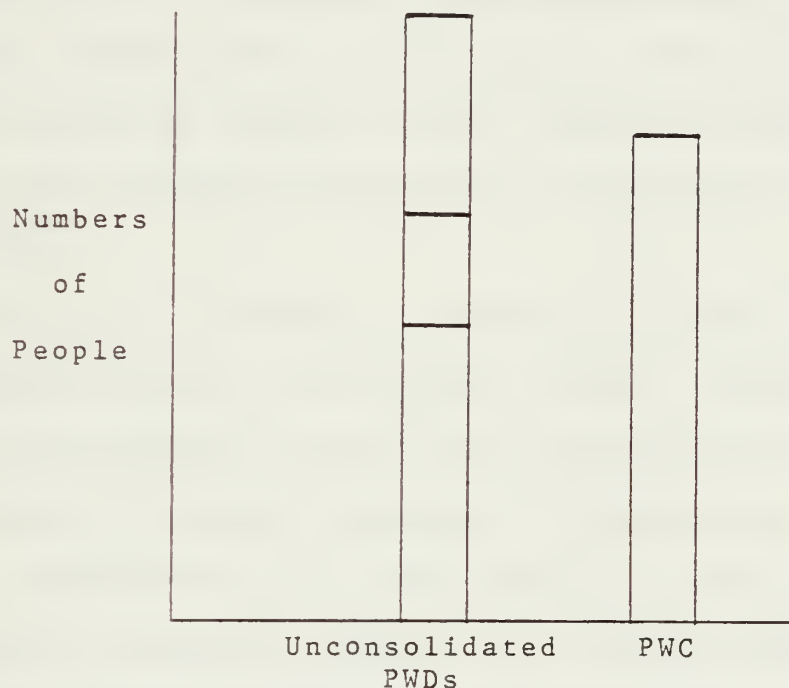


FIGURE 5. COMBINATION OF RESOURCES.

In the aggregate, tools and equipment inventories can be reduced and utilization can be increased, thereby resulting in reduced costs. Tools and equipment are not utilized all of the time. Idle time means expenses without any offsetting benefits. With increased workload and a greater base of operations, tools and equipment utilization factors will

increase, even to the point of reducing the required inventory. Maximum utilization with the fewest items can be achieved through the scheduling function. For example, safety and standby equipment are not used in daily operations, but are needed for a very limited, but necessary requirement. Each PWD may require one such item whereas a PWC can use fewer than the sum of all PWDs, due to the centralized operations. Also, the larger scope of operations makes procurement of additional specialized, labor saving, or technically advanced equipment and tools justified; thereby further reducing costs and increasing the extent and magnitude of the type of services being offered.

Construction and automotive vehicles are also reduced while achieving greater utilization factors. Automotive vehicles are allocated to meet peak operating requirements. During periods of reduced workload, the vehicles are not utilized. Since the sum of each activity's peak demand requirements is something greater than the peak demand of the combined total, greater usage results. This is due to the stochastic nature of peak demand. Also, construction equipment is allocated to provide basic capability, although workload is usually low throughout the year. Combined equipment inventories allow the reduction in the total numbers of construction vehicles.

A public works function consolidation also reduces overall facility requirements. Instead of having several buildings

(i.e., one at each activity), each housing a similar function (i.e., a carpenter shop with various woodworking machines), there is now one facility in a centralized location with sufficient size to maximize personnel and equipment utilization based upon expected workload. This combined facility requires less square footage of building and less equipment than the total of the individual facilities. Facility maintenance and repair costs plus equipment maintenance and operation costs are reduced.

Combined productive personnel requirements tend to be the same as before the consolidation with the exception of the introduction of labor saving tools and equipment. The manhours to paint a building or repair a steam trap essentially remain the same. A combined workload, however, allows skill specialization which contributes to improved efficiency.

The overhead personnel requirements for non-productive and general and administrative functions are reduced during a consolidation. By consolidating the overhead functions common to each activity, redundant actions can be eliminated. The greater workload allows work specialization and improved efficiency. It also allows for the implementation of management tools and systems not justified previously; i.e., a computer. Spans of control can be maximized to eliminate unnecessary supervisory personnel and middle managers. For example, rather than having a fiscal officer for each location,

there is only one. With a combined workforce, there is greater backup or flexibility to maintain office operations while some of the office personnel are on sick or regular leave. The larger workforce means that managers will tend to have higher grade levels, and as a result, tend to have more management expertise. [7]

The total cost savings attributable to PWC consolidations are show in Figure 6. PWC, San Francisco Bay is not included. The savings of personnel, transportation vehicles, shop equipment and facilities are demonstrated. These computations are from Navy Area Audit Service reports or PWC and NAVFACENGCOM reports.

	<u>Number</u>	<u>One-time</u>	<u>Annual</u>
Personnel	3,553	---	\$20,058,744
Transportation Vehicles	1,355	\$3,649,374	973,995
Shop Equipment	647	529,106	151,029
Shop Space	792,838	---	233,071
		<hr/>	<hr/>
Totals		\$4,178,480	\$21,416,839

FIGURE 6. PWC CONSOLIDATION SAVINGS

As with any action or change, there are both advantages and disadvantages. One of the main disadvantages is the erosion of the local activity commanding officer's (CO) authority. [8] The CO retains the responsibility to plan, program, and maintain the facilities. The CO also retains

the funding to do this. The change is in the means to accomplish the public works function. Prior to the consolidation, the local CO was in control of the forces which performed the work. After the consolidation, those forces are no longer the CO's. Therefore, COs can come to view the consolidation as an erosion of their ability to accomplish assigned missions and tasks.

The CO has no direct control over work accomplishment since the service is provided by another command. At the PWC, one local activity's work now competes with all other activities' work for accomplishment. Before the consolidation, the CO had a dedicated workforce for which he or she could directly set work accomplishment priorities. Although the PWC COs appreciate the situation and endeavor to accommodate local COs where possible, after the consolidation, the CO can not necessarily dictate when the work will be done.

The PWC customers will appear to pay more to get the same quantity of work done, however, this conclusion is in error. The differences in accounting systems used by PWCs and PWDs plus the consolidation implementation create this illusion. See Chapter II, Section G.

To summarize, the advantages and disadvantages resulting from the consolidation of public works functions in a geographical area are listed below:

1. Advantages

- a. Eliminates redundant equipment and facilities.
- b. Reduces non-productive personnel.
- c. Provides higher management expertise.
- d. Decreases costs to the Navy.
- e. Improves utilization of equipment and facilities.
- f. Allows trade and skill specialization.

2. Disadvantages

- a. Erosion of local activity Commanding Officers authority.
- b. Work competes with other activities.
- c. Costs to public works service appear to increase.

D. THE CONSOLIDATION PROCESS [9][10]

The procedural steps for consolidation are not specified in any documentation. The general process, however, is explained in this section based upon the author's experience with the actual consolidation of the Naval Air Station, North Island, California with PWC San Diego, and interviews with knowledgeable personnel in the NAVFACENGCOM hierarchy. Therefore, direct references will not be rendered in all instances.

The Secretary of the Navy Instruction 5450.9 series provides the basic policy regarding consolidations of public works functions. The policy is to:

"Consolidate Real Property Management Activities and other public works functions into PWCs at those naval complexes where feasibility studies indicate that a PWC can provide

more economical service without loss of mission support than that provided by activity Public Works Departments (PWDs) or Public Works Lead Activities (PWLAs)."

There are no specific criteria or conditions necessary to initiate a proposal for a consolidation. However, unofficial guidelines do exist for initially considering a consolidation request. These unwritten criteria are: more than three major customer activities, more than 1000 public works personnel, and at least \$30 million annual volume of business.[8][11] These are not stringent thresholds, but only serve as a starting point.

A public works functional consolidation can be initiated by direction from higher authority or by a request from a local activity. The idea of increased effectiveness, efficiency, or cost savings through consolidation of public works functions can originate from any responsible official. Some of the present PWCs were the result of a planned evolution by NAVFACENGCOM. Other PWCs resulted from one-time, individual investigations. For example, the Port Hueneme/Point Mugu consolidation study resulted from a local commander's official letter proposing that a consolidation might be beneficial.

Once the idea is born, a feasibility study is conducted. If no existing PWC is involved or located in the near vicinity, the task of the study will fall under the jurisdiction of the appropriate NAVFACENGCOM Engineering Field Division.⁴ If a PWC is involved or near the target location,

personnel from that PWC will conduct the study. Assistance may be provided from the PWDs involved.

The feasibility study is a detailed analysis of the effects of the consolidation. The investigators gather specific information concerning people, facilities, tools, equipment, vehicles, workload measures, non-PWD support costs,⁵ facilities conditions, etc. The data are combined and analyzed. Projected operating costs are compared to present costs to determine before and after consolidation differences. Personnel requirements are determined and potential reductions of the labor force are identified. The costs to accomplish the consolidation including facility construction and improvements are also identified and calculated. The feasibility study concludes with the listing of cost, personnel, equipment, facilities, and tool reductions, if any.

The completed study is forwarded via the local activities' chain of command and other interested commands for recommendatory endorsement, to the Chief of Naval Operations (CNO). From the study, all of the endorsements, and a Navy Audit Service audit of the cost analysis, the CNO makes the final consolidation decision.

With a decision to consolidate, the planning phase begins. The feasibility study personnel compile an implementation plan with detailed action steps, identification of personnel to accomplish each step, and start-stop dates. Then the plan is executed. Usually 12 to 18 months elapse between the final

decision and the actual consolidation date. This period allows for the completion of planning and the execution of all the tasks which must be accomplished before the actual consolidation.

The preparatory steps are many and detailed. It is not unusual for the preparation to take a year of effort. Some of the steps which must be completed are: an inventory and inspection of all resources as to condition; identification of which resources will be transferred and which will remain; identification of all PWD functions, determining which will be transferred; identification, quantification, and transfer of applicable funding; reduction of the labor force as applicable; establishment or integration of the new workload at PWC; negotiation and finalization of support agreements between the PWC and its customers; establishment of service rates; inventory and transfer of resource records such as personnel files and building as-built drawings⁶; capitalization of acquired assets; establishment of a revolving Navy Industrial Fund (NIF) account.

Several additional points must be mentioned for the reader to grasp the essentials of a consolidation. First, the local activity retains ownership to and responsibility for the maintenance and repair of land, buildings and structures. Only those facilities which will be used by the PWC are transferred to the PWC. Second, all utility plants, associated equipment, and distribution system are transferred to

PWC ownership. Third, no funds are transferred from the local activity to the PWC for the maintenance and repair associated with the transferred facilities. Fourth, the local activity retains the funding for annual operations and to buy service from the PWC. Funds are transferred for the services provided at no cost by a PWC. These services include the annual inspection of facilities and engineering services including design for projects costing less than \$10,000.⁷

For large, landing owning local activities, a military and civilian staff is retained to carry out the budgeting, planning, programming, maintenance scheduling work input to PWC, and other facility management responsibilities. These offices represent the residual part of the PWD which remains with the customer. It is called the Staff Civil Engineer Office. For smaller activities, the PWC customer liaison office provides the necessary assistance. In many cases, however, these activities obtain a facility manager to fill the void created by the consolidation. [2]

As discussed above, the consolidation process entails the study, decision, planning, and execution phases. These phases are designed to identify the applicable economical and operational advantages, and to affect a smooth and efficient transition on the effective date of the consolidation.

E. THE PUBLIC WORK CENTER ORGANIZATION

Early PWCs were organized in a manner similar to the PWDs from which they originated; Figure 7. [11] The former PWD structure and informal information systems could not cope with the magnitude of increased operations and the complexity associated with managing a much larger organization. Changes and improvements were required to provide the managers with adequate management information and control.

In the mid 1960s NAVFACENGCOM, as the PWC operational and administrative commander, began developing new organizational structures with computer assisted information systems. In 1965, the first standard organization was introduced. After review and evaluation of the initial standard organization by the PWCs, COs concluded that additional changes were needed to make the whole system more effective and efficient.

A management study was conducted at all PWCs during 1973. This study identified functional areas which needed improvements. As a result of the study, PWC, San Diego was selected as the test location for the development of a revised standard organization. This new standard organization has been developed and finalized. Action is now underway in varying degrees at every PWC to conform to this standard.

Even after the standard organization has been fully implemented at every PWC, there will still be certain variations. For example, the size and type of customers served may not warrant particular aspects of the

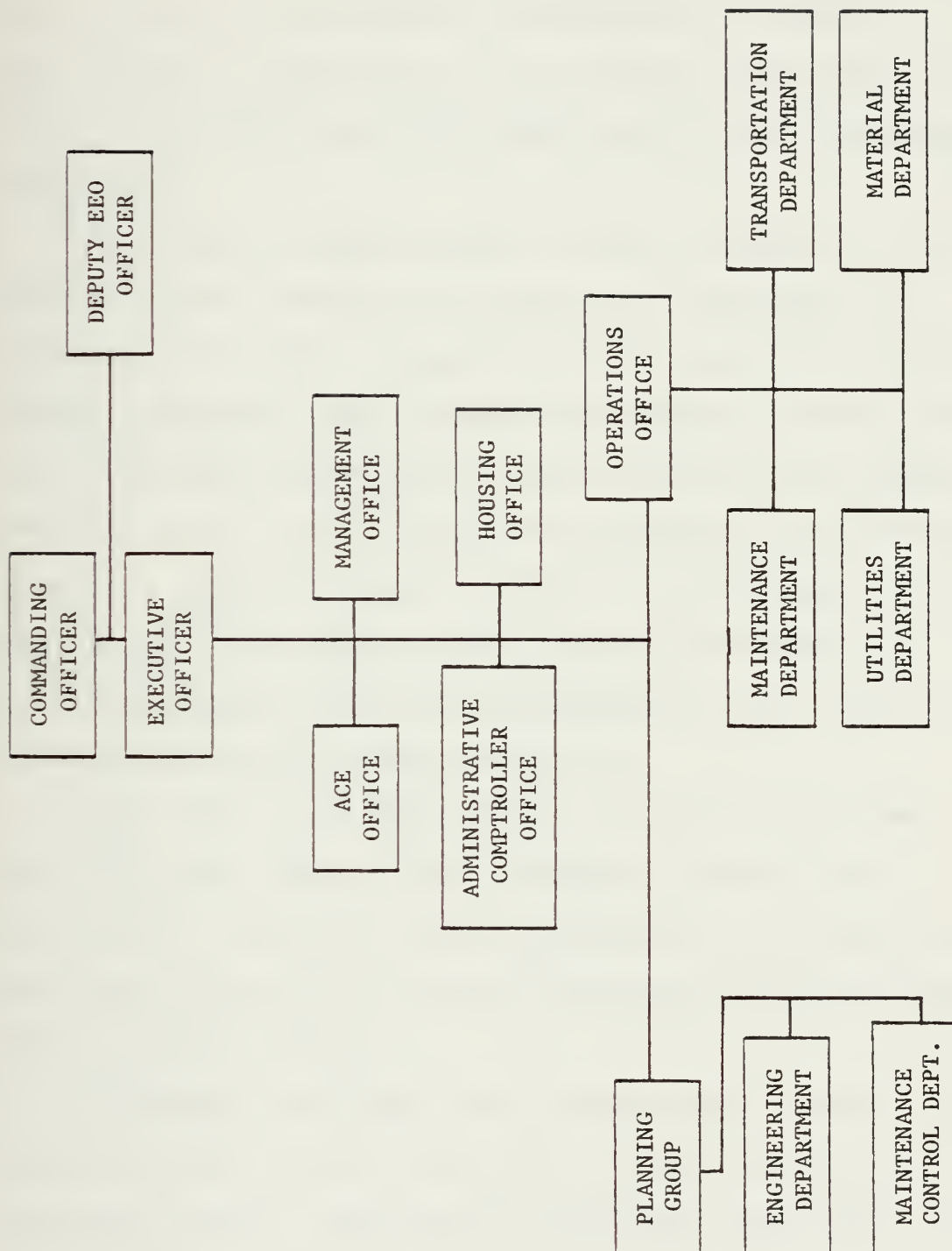


FIGURE 7. EARLY PWC ORGANIZATION

standard organization. Also, factors such as economies of operation, response, dispersion of plant facilities, extent of purchased or contracted services, and other conditions may negate the need for certain organizational elements. Finally, the location of the PWC (U.S. or overseas) and differing operational environment may require particular and special deviations.

The standard organization is shown in Figure 8. [12] This structure has been developed after many years of experience and with a collective effort from the assistance of many managers. The standard organization allows centralized technical and managerial assistance from NAVFACENGCOM concerning work flow, processing procedures and information systems. Operating and performance data from each PWC are comparable. Civilian personnel position descriptions, workload measures for ceiling assignments, and staffing criteria are easily facilitated. [13]

Under the CO and the Executive Officer of each PWC, there are four basic groups: staff, support, planning, and production. The staff group is composed of the Deputy Equal Employment Opportunity Office, the Public Affairs Office, and the Safety Office.

The support group performs nonproductive, general and administrative overhead functions. These are Activity Civil Engineer Office, Administrative Services Department, the

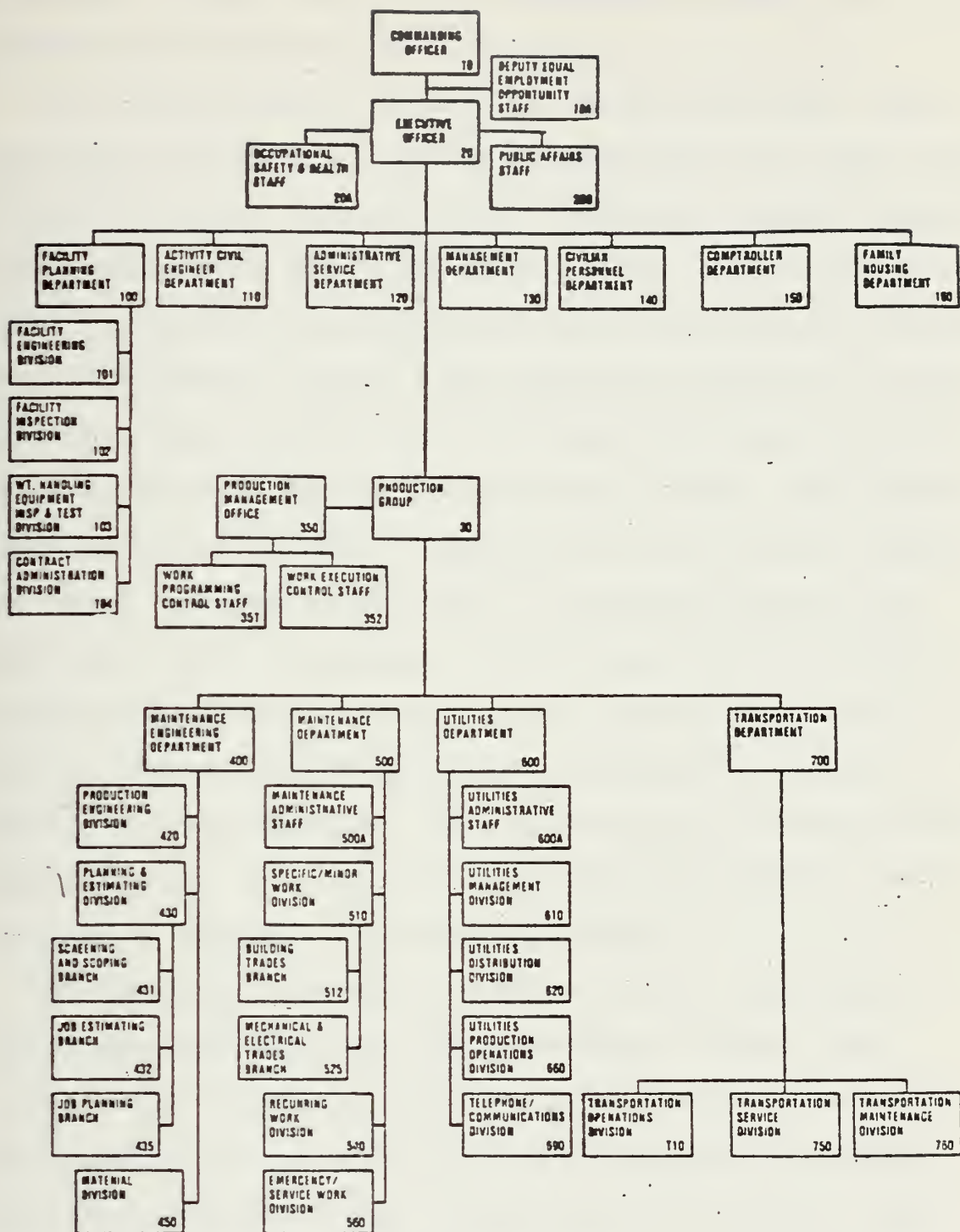


FIGURE 8. PUBLIC WORKS CENTER STANDARD ORGANIZATION

Management Office, the Civilian Personnel Office, the Comptroller Office and Family Housing.

The planning group is composed of four divisions. The Facilities Engineering Division provides short and long range planning both for real estate and facilities, project development, engineering investigations, facility studies, design plans and technical specifications for construction contracts, and environmental studies. The Facility Inspection Division conducts annual inspections of customer buildings and structures to identify maintenance and repair needs. The Weight Handling Equipment (WHE) Inspection and Test Division inspects and tests the operations of WHE. Equipment operators are also certified for licensing. The Contract Administration Division advertises or negotiates all PWC contracts for design, engineering investigation, maintenance service, repair, and construction. This division also conducts field administration, inspection of contractor performance, certification of payments, and work acceptance.

The production group is composed of five departments. The Production Management Office monitors, tracks, and controls all maintenance and repair work flowing through the PWC organization. Much of this work is scheduled through the various organizational elements by this office. This office analyzes production trends, determines the proper allocation of resources, and evaluates backlog to determine

the level of contracting. The Maintenance Engineering Department has three main parts. The Production Engineering Division designs all work which the maintenance shops will accomplish. It may also prepare the contract design plans and specifications for the locally funded jobs which have been selected for contract accomplishment. The Planning and Estimating Division provides customers with cost estimates for various types of work; identifies job scope; breaks this scope into specific tasks; determines material requirements for each task; and sequences the tasks. The Material Division buys the required material, receives and stores the material until job execution, and delivers the material to the job site. It also maintains a shop store inventory of high usage material items. The Maintenance Department consists of the journeymen trade personnel who actually perform the maintenance, repairs, and construction at the jobsite. The Utilities Department operates plants and generates or purchases utilities such as compressed air, electricity, steam, natural gas, etc. It plans, operates, and maintains utility distribution systems. It also provides utilities to ships in homeport, and operates the telephone systems. The Transportation Department controls the assignment and operation of the construction and automotive vehicles. It provides equipment support to the maintenance shops, and material and weight handling support to other customers directly. The department

maintains all vehicles under its control. It also leases equipment as the need arises to meet peak workload requirements.

To indicate the relative size of each PWC, Figure 9 shows the fiscal year 1979 civilian and military personnel, and total annual dollar amounts of business for the Navy Industrial Funded PWCs.

	<u>Revenue (thousands)</u>	<u>Civilian</u>	<u>Military</u>
Norfolk	97,032	1815	18
Pensacola	32,011	637	7
Great Lakes	34,083	609	11
San Diego	129,801	1972	20
San Francisco Bay	58,762	1088	12
Pearl Harbor	88,374	1571	13
Guam	45,105	1175	11
Subic Bay	39,101	2367	15
Totals	524,269	11,234	107

FIGURE 9. COMPARISON OF PWC OPERATIONS.

F. THE PUBLIC WORKS CENTER MISSION

The PWC mission is to provide all public works support to the local activities. Specifically, it is

"to provide public works, public utilities, public housing, transportation support, engineering services, shore facilities planning support, and all other logistic support of a public works nature incident thereto, required by the operating forces, dependent activities, and other commands served by the PWC." [14]

The public works support includes the full cycle of events concerning real estate and structures. It includes real property acquisition (buying, selling, and leasing); planning future requirements; identification and programming of facility projects; engineering design and facility layout; facility construction or acquisition (i.e., lease or rental guarantee); maintenance, repair, overhaul, alteration, and additions to real property; equipment installation; engineering studies; inspection and deficiency identification; and, real property disposal. The real property life cycle is shown in Figure 10.

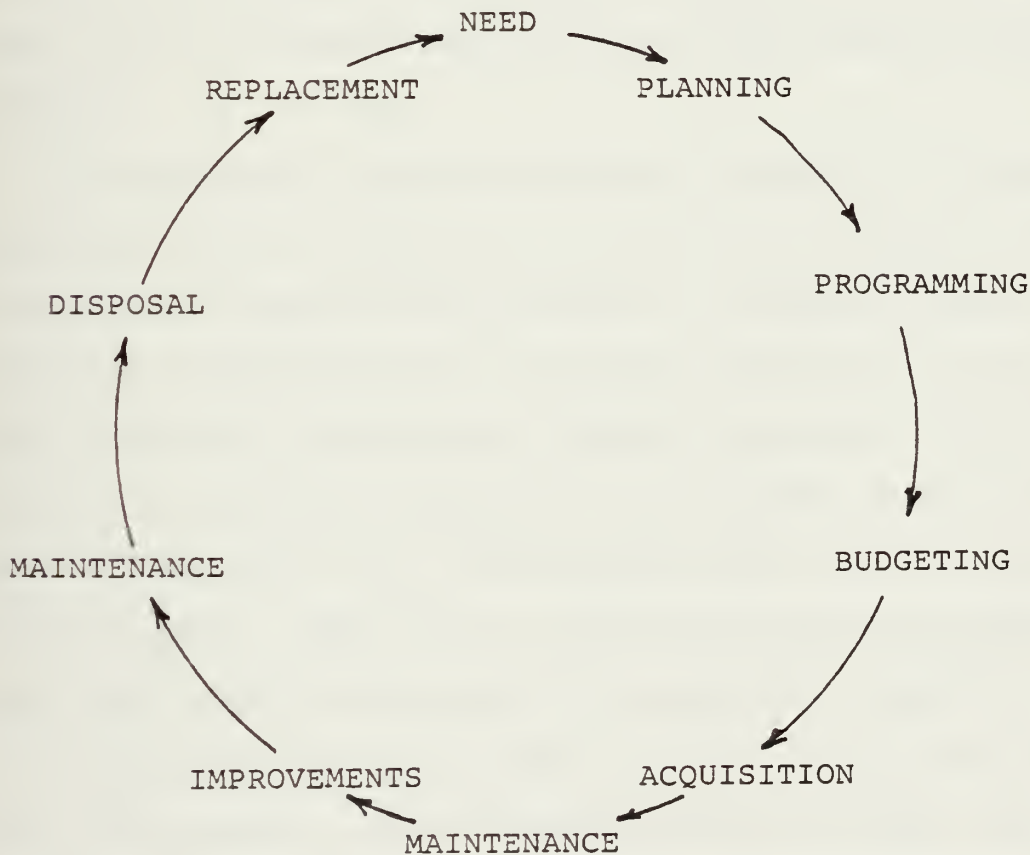


FIGURE 10. REAL PROPERTY LIFE CYCLE

PWCs also have mission responsibilities in areas such as utilities, transportation, environment, and housing. PWCs operate utility generation plants such as steam, electricity, compressed air, or contract for these commodities from commercial sources. PWCs own and operate the utility distribution systems for the above utilities, plus they provide water, sewage, industrial waste, natural gas, and telephone services. PWC responsibilities include both short and long range planning for improvements and expansions as well as normal maintenance and repair. They also include energy conservation, with programs ranging from turning out the lights to computerized multi-building energy control systems.

The operation and maintenance of automotive, construction, railroad, weight handling, aircraft ground support, material handling and specialized vehicles or equipment such as fire trucks and ambulances fall under the PWC area of responsibility. The automotive vehicles are customer operated. Other than certain specialized equipment, the remaining types of vehicles are PWC operated; i.e., crane service for loading and off-loading ships. PWCs rent or lease additional equipment to meet peak workload periods or to supplement capacity.

PWCs are the organizations to which local activities turn for environmental issue assistance such as noise, water and air pollution, airfield encroachment, local and state government land use regulations, sewage treatment, work space

enhancement, and traffic control. PWCs may not specifically have expertise in these specialized field, but they do represent the local point of contact, and can draw upon the expert assistance of NAVFACENGCOM or commercial firms.

The Navy operates family housing to supplement the local communities' housing market. The programming, funding, and operation of these units fall under the purview of NAVFAC-ENGCOM, and therefore PWCs. Planning, community and recreational facilities, financial management, furnishings and appliance control, assignment of personnel, tenant regulations, and maintenance and repair constitute the major housing responsibilities. Family housing can be provided by Navy owned and operated and constructed facilities, or by commercially owned and operated facilities through a contract or agreement.

As noted in Chapter I, PWC functions basically include those specifically assigned to NAVFACENGCOM. Real property support functions are for the most part well defined; however there are certain "grey" areas when determining who does what in the Navy. For example, where the exact split between the Naval Supply Systems Command (general logistic support) and NAVFACENGCOM procurement responsibilities lie is a matter of interpretation and negotiation. Another example is the technical responsibility for certain electrical detection systems between the Naval Electronics Systems Command

and NAVFACENGCOM. Such matters are resolved by local agreement, higher authority direction, or negotiation. These agreements or decisions may cause variations in specific PWC functions, and from site to site.

The PWCs, when requested, also assist the local activities in their facilities management responsibilities. This includes things like maintenance planning, such as determining when maintenance should be done; budget formulation, such as determining how much funding is required to properly maintain the facilities; and budget execution, such as planning maintenance activities throughout the year to meet requirements yet remain within the constraints of the budget.

G. NAVY INDUSTRIAL FUND

Eight of the nine PWCs use the NIF accounting system.⁸ This section describes the NIF system and explains how it applies to PWCs and to specific work.

The NIF is a revolving fund used to finance the operation of designated industrial and commercial type activities. It is designed to be a self-sustaining operation in that the fund, or corpus, is reimbursed for costs incurred from customer funds appropriated to pay for the product or service rendered. NIF operations are generally planned on a no profit or breakeven basis.

The NIF has its origin in the National Security Act of 1947 (NSA) as amended by the Congress in 1949 in recognition

of the need to promote efficiency and economy in Department of Defense (DOD) operations. The NSA authorized DOD to establish revolving industrial funds separate from annual appropriations. These funds perpetuate themselves through the customer reimbursement for services received. The NIF accounting system is employed at activities such as shipyards, aircraft rework facilities, research laboratories, ordnance facilities, printing and publication services, military sealift command, engineering centers, and more recently the Trident submarine facilities.

The criteria for NIF is that a common good or service be provided to more than one customer and that a buyer-seller relationship exists. [15] The establishment of a NIF involves the following concepts: establishes a private industry environment; establishes a contracting type relationship; elimination of "free" nonessential services; encourages consolidation of functions and provision of services to other agencies; allows accrual and job order accounting plus improved managerial accounting; work price is established prior to work accomplishment; free of the appropriation cycle; and budgets are based upon anticipated workloads. [16]

The NIF cycle is shown in Figure 11. The PWC estimates the workload in direct labor hours. It determines non-productive and overhead expenses required to support that level of operations. Rates are then calculated and published

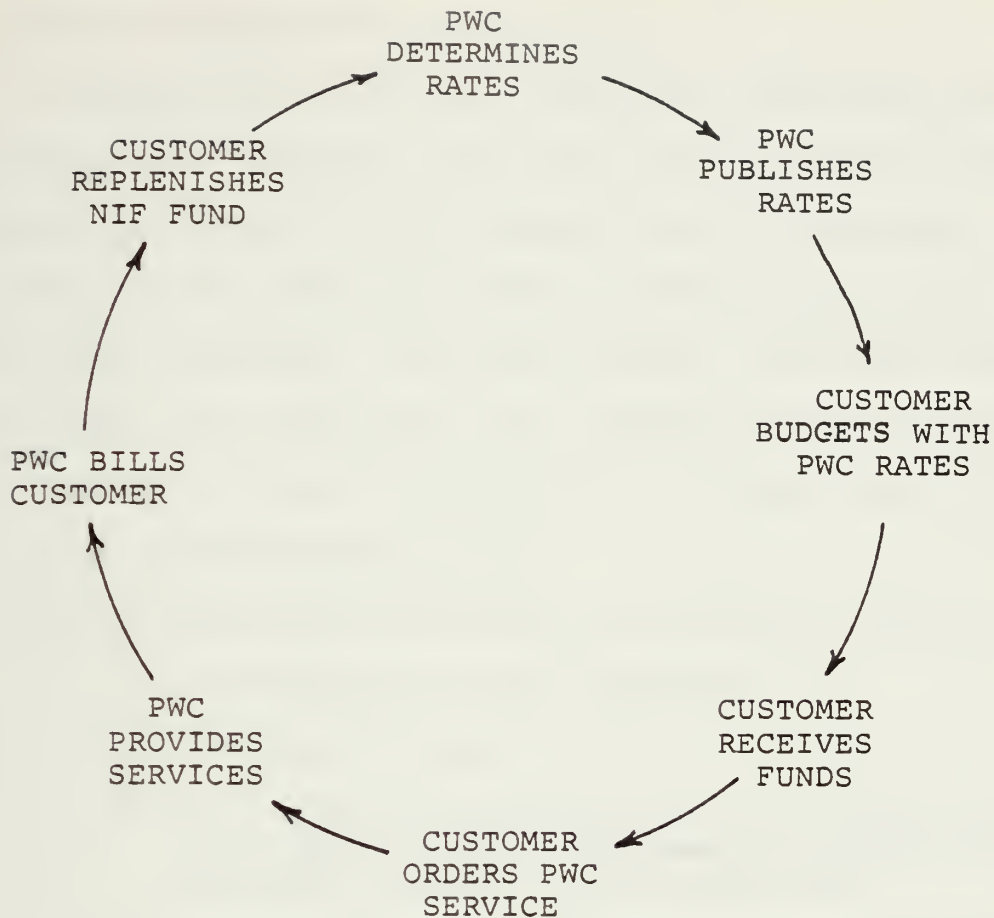


FIGURE 11. NIF CYCLE

to the customers for the forthcoming year. The customer activities request funds necessary to purchase the planned or required level of PWC services.

During the year, the customer places orders for PWC services and obligates money upon the receipt of a PWC fundable estimate. The PWC utilizes its revolving fund to pay for the work processing, material procurement, and direct

labor charges. As the work is completed, customer funds are billed to replenish the PWC fund.

In theory, the fund should replenish itself and break even each year. However, the whole process hinges on the forecasting accuracy of the workload and the expenses. The PWCs can and do close out a fiscal year with operating deficits or surpluses. When this occurs, the next rates established, the third year out, account for the increases or decreases to erase the variations. NIF process operates on a three year breakeven cycle.

The NIF operations includes several unique aspects: [17]

- (1) A PWC has no profit incentive.
- (2) PWCs pay no taxes.
- (3) PWCs make no expenditures for equipment costing over \$1000 or for improvements or additions to facilities from its revolving fund.
- (4) Costs do not include depreciation on equipment or facilities.
- (5) Military salaries and wages are not included as part of operating costs.
- (6) PWCs receive some "free" support from other activities particularly its host in accordance with a host/tenant agreement.⁹
- (7) PWCs provide some "free" inspection and engineering support to commands and are reimbursed with annual appropriations by NAVFACENGCOM.

The NIF accounting system may cost the local activity more, as opposed to the Resources Management System utilized prior to any consolidation. This result occurs because of the costs which are included in the PWC rates and the way

that the local activity implements the consolidation. Figure 12 shows the accounting differences which appear in customer costs. The customer of a PWD pays only for the direct costs whereas the activity operating budget pays for all the administrative and overhead costs. When the same customer receives the same service from a PWC, that customer pays more since all the overhead charges are included. For example, when the Naval Air Station, North Island, California consolidated with PWC, San Diego, the PWD could not purchase the same amount of services from the PWC as previously acquired since the PWC costs included the non-PWD support costs such as civilian personnel, supply department, etc. The author calculated that \$350,000 would have to be transferred to the PWD budget from the other activity support areas to purchase the same amount of services from the PWC. That amount, however, was not internally transferred for various reasons; so PWC service was more costly, or at least, it appeared to be more costly.

H. PUBLIC WORKS CENTER MANAGEMENT SYSTEM [18][19][20]

The Public Works Center Management System (PWCMS) is a full integrated computerized system providing financial and managerial accounting information. It also includes work processing and scheduling subsystems. The system receives data input concerning just about all phases of PWC service, particularly specific work, and it generates a variety of reports. This section discusses the development of PWCMS and how it relates to specific work.

LABOR CHARGES

NIF PWC CHARGES
A CUSTOMER

AN NAS PWD
CHARGES A CUSTOMER

CUSTOMER	DIRECT	X	LABOR	X	CUSTOMER PAYS ONLY THESE
		X	FRINGE BENEFITS	X	
CUSTOMER	ACCELERATION	X	SUPERVISORS	NONE	
		X	MAINTENANCE OF SHOPS	NONE	
PAYS	SHOP OVERHEAD	X	SHOP TOOLS/EQUIPMENT	NONE	
		X	JOB SCHEDULING	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	TRAINING	NONE	
		X	REWORK	SOME	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	PLANNING & ESTIMATING JOB	NONE	NAS OPERATING BUDGET ABSORBS
		MOST	CUSTOMER LIAISON	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	BUDGET/RATE MAKING	NONE	
		X	ADP	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	MAIL/MESSENGER	NONE	
		X	SAFETY	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	NEWSPAPER/PAO	NONE	
		X	MANAGEMENT ANALYSES	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	CATALOGUES/TECH MANUALS	NONE	
		X	ACCOUNTING	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	BILLING	NONE	
		X	RECRUITING	NONE	
ALL	SERVICE AND ADMINISTRATIVE OVERHEAD	X	LABOR RELATIONS	NONE	
		X	GET MATERIAL	NONE	

FIGURE 12. THE REAL COST OF DOING BUSINESS.

As stated previously, the initial PWCs were organized similarly to the PWDs from which they originated. In effect, the initial consolidations formed one large PWD from several smaller ones. The organization, workflow, and management information systems were informal and manual. With the increased size of operations, these PWD systems did not provide the managers with the information required to make decisions nor process work to meet customer requirements.

NAVFACENGCOM began to tackle these problems in the early 1960s. When the first standard organization was introduced in 1965, the need for a Management System began to evolve. In 1968, the initial mechanized PWCMS was initiated. In 1969, the Corporate Management Program was started.¹⁰ These initiatives were the first steps in making major changes in the manner of providing service.

The need for a more effective and efficient PWC work management system was voiced by the PWC COs at the March 1973 Corporate Management Workshop. A system was required which would provide the PWC managers with the information necessary to make operational decisions. A team of managers was formed to identify and study the problems, and to make recommendations about specific work management from the initial request submission to physical completion and billings. The initial study proposal was developed by the team and approved by NAVFACENGCOM in May 1973. During the summer, the study was conducted at all PWCs. Each PWC production management system

was reviewed and studied. Historical data was analyzed and interviews were conducted with all managers. From this investigation, management information deficiencies and work processing problems were identified. The team developed a new workflow concept as well as a compatible organizational structure. The requirements for a new management system were also identified. The study results were presented at the September 1973 Corporate Management Workshop. Based upon this study, the PWC COs approved an action plan to implement the newly developed concepts.

The study proposal contained several new concepts for processing specific work. Since only 60 percent of all the fully planned jobs were then funded, the concepts of scoping and estimating each job prior to funding, and planning only funded jobs were introduced. To enhance control and integrate all organizational elements, each PWC manager was to be held accountable for accomplishing the workload to meet established response criteria with the staffing level identified for that workload. This responsibility concept was applied to both the planning and production areas.

A major objective of the new system was to improve specific work response; that is, providing the customer the service of estimation and completed work as rapidly as possible. To achieve this objective, the work scheduling had to become more important. The key factor was that the schedules and the job plans had to be considered mandatory rather than

advisory documents. The study proposed an office to centrally control and schedule all customer work through the entire process. The new Production Control Office would be the focal point for all specific work processing and would have the aid of a comprehensive computerized management system which would identify and control work input and backlog. The system would also provide job status and related financial charges. It would further provide a reporting process so followup action could assure compliance with schedules and job plans.

PWC, San Diego was selected by NAVFACENGCOM as the pilot site for development and initial installation of the new concepts. The organization was changed, civilian personnel positions were realigned, and the number of positions were reduced. The PWCMS and its subsystems were designed for job loading and scheduling, job status and feedback, labor and cost accounting, and material and manpower availability. These systems were designed, implemented, tested, and refined. The PWCMS has been fully developed and is presently being implemented at all PWCs.

I. PUBLIC WORKS CENTERS SERVICES [20][21]

PWCs provide a wide range of services under their assigned missions. The ability to contract services makes the choices available almost unlimited. This section focuses on the basic in-house capability common to all PWCs.

PWC services can be classified under one of the following categories; emergency-service, minor, engineering, recurring, transportation, utilities, and specific.

1. Emergency-service

Emergency service work is normally maintenance, repair, or alteration work performed by the Maintenance Department which can be accomplished in 16 or less manhours. It is work which requires no planning or engineering. Due to the nature of emergency-service work, the Maintenance Department receives the requests from the customers by telephone and accomplishes the work with minimum assistance from other departments. Emergency work takes precedence over non-emergency work and requires immediate attention to accomplish any or all of the following:

- a. Prevent loss or damage to government property.
- b. Restore essential services that have been disrupted by breakdown or utilities.
- c. Eliminate hazards to personnel or equipment.

The response targets established by NAVFACENGCOM for emergency-service work are:

	Percent of Jobs Complete in Number of Calendar Days		
	50	80	95
Emergency	same day	1	2
Service	4	7	17

The journeymen operate from radio controlled utility trucks which carry a number of high usage material items. The service is similar to that provided by a plumber or electrician making private house calls, except that a PWC provides the complete range of service.

2. Minor

Minor work is larger than emergency-service, but smaller than specific work. Minor work is small, simple jobs requiring minimal planning and control. More specifically, a minor job must meet the following conditions:

- a. Less than 80 manhours.
- b. Simple, not complex, usually one to three trades.
- c. Less than 25 material line items.
- d. No engineering other than consultation.
- e. Funded with the use of prearranged funding and job

order numbers.

Any work which fails to meet the above criteria is treated as a specific type job. Minor work is accepted by a PWC either on a written work request or over the telephone. A planner and estimator (P&E) determines job scope, making a work site visit if necessary, and material requirements. After the purchase and receipt of all material the minor work is scheduled to the Maintenance Department. The NAVFACENGCOM response targets for minor work are:

•

	Percent of Jobs Complete in Number of Calendar Days		
	50	80	95
Preparation of job plan	4	5	7
Material procure- ment: CONUS ¹¹	14	21	28
Pacific ¹²	30	45	60
Construction	7	14	21

3. Recurring

Recurring work is repetitive work of a maintenance or minor repair nature repeated throughout the course of a year. Recurring work criteria is:

- a. Repetitive and follows an established cycle; daily, weekly, or monthly.
- b. The work can be defined and planned in advance.
- c. The work can be scheduled for accomplishment without dependence on completion of some other task or occurrence of some other event.

Recurring work includes routine maintenance, preventive maintenance inspection, and equipment inspection services. These services provide inspection for deficiencies, minor adjustments for operating efficiency, lubrication, and minor repair of equipment items which do not have assigned operators.

Routine maintenance includes all of the daily type work required to keep a facility or system in operating condition; i.e., janitorial service, grounds maintenance, and air filter cleaning. Minor repair includes the replacement of damaged

or worn components of equipment. Preventive maintenance and inspection includes manipulation of controls, monitoring gauges performing tests and other actions required to assure continuing and proper performance of the equipment or systems. Job plans for the recurring work are written and funded plus personnel scheduled for the full term of service but not greater than one year.

4. Engineering

Engineering service can be an intermediate or end product. It can be in the form of consultation, study or report, design, contract specifications, project preparation, or a development plan. As explained in the earlier section on the PWC organization, customer engineering services are provided either by the Facilities Engineering Division of the planning group, or the Production Engineering Division of the production group. Examples of the types of engineering service provided are:

a. Consultation. Interpretation of building codes, standards, drawings, contract plans and specifications; inspection of delivered equipment or material for acceptance; field assistance to jobs in progress on method or direction of work; advice on correction of equipment malfunction; assistance to P&Es on development of the job plan.

b. Studies and reports. Investigation or analysis of a problem and determination of alternative solutions; the

feasibility of a course of action; assessment of an existing or future condition; structural strength of a building.

c. Design. Production of design drawings for records purposes, projects, or shop accomplishment.

d. Contracts. Production of drawings and technical specifications for contracts.

e. Project preparations. Investigation, analysis, cost estimation, and preparation of project submittals which will be approved and funded by higher authority; i.e., special projects approved by the major claimant and military construction projects approved by the Congress.

f. Development plans. Space utilization and layout for buildings; traffic flow plans for pedestrians and vehicles; utility expansions; master plans for entire military installations.

5. Transportation

The Transportation Department maintains custody of all automotive, construction, weight handling, and material handling equipment, plus certain other controlled custody equipment such as electrical generators. Automotive equipment is assigned to customer activities based upon need and usage. An automotive dispatching pool is operated for collective support of transportation needs not requiring full time assignment. The other types of vehicles and equipment are provided to customers with PWC operators on a case-by-case basis. The Transportation Department maintains and repairs

all assigned PWC controlled vehicles and equipment, plus any controlled by the customer commands, as requested. Rental and lease vehicles or equipment are obtained as the need arises to support peak workload periods, replace nonoperational equipment, or to obtain extra capability.

6. Utilities

Utilities refers to electrical power, telephone systems, fire protection distribution systems, water supply and treatment, centralized heating systems, sewage collection and treatment and disposal, centralized air conditioning systems, natural gas, compressed air, industrial waste systems, and mobile utility support systems. [22] The Utility Department manages, operates, and maintains utility generating plants and distribution systems, as applicable. Not all PWCs have all of the utilities mentioned nor the associated generating plants and distribution systems. Some of these services are purchased from commercial sources. PWC is responsible to plan, improve, and expand utility services to meet the needs of its customers. When new utility requirements originate, PWC works with the customer to provide the new service. As a result of the consolidation economies of scale, utilities are one area where by-products from the larger base of operations can be utilized; i.e., the use of organic trash to generate heat and electricity.

7. Specific work

Specific work is discussed in detail in the next section.

PWCs may provide other services in addition to the ones specified above, or they may provide only part of those mentioned. As explained in Chapter II, Section D, the consolidations process, there is a certain degree of negotiation which may not provide the full range of public works services. For example, telephone service operation was retained by the Naval Air Station, North Island when it consolidated with PWC, San Diego. Also, site location may dictate unique operations. For example, PWC, Subic Bay is the only PWC which runs a saw mill producing lumber for its own needs.

J. SPECIFIC WORK [20]

This section focuses on specific work which is the primary subject of this thesis. Specific work will be defined, described, and examples given of the various types of specific jobs which PWCs encounter. The work flow process will be described and charted. Other aspects such as response goals, priority system, funding, and customer actions will also be explained.

The term "specific work" refers to all work which does not fit into another classification. It is any one time, nonrepetitive job which requires over 80 manhours of effort. One or more journeymen trades can be involved in the

work accomplishment. The work may or may not require engineering or material support. The job may also be supported by equipment and contracts or could be 100 percent contracted.

Specific work can be maintenance, repair, renovation, alteration, improvement, construction, equipment installation, or equipment overhaul type jobs. The work can involve: real estate such as landscaping; structures such as above or below surface antenna arrays, piers, tanks, and towers; mooring systems; airfields and all the related components; fuel farms and distribution systems; ammunition and ordnance complexes; utility generation and distribution systems; buildings of all sorts from warehouses and family housing to industrial production facilities, complex training facilities, and environmentally controlled spaces; road systems from dirt to multiple lane highways; and systems to clean things such as air scrubbers, waste treatment plants, and noise abatement chambers. Depending on the location and the particular customers, PWC specific work can service a very wide spectrum of structures, facilities, and systems.

The size and complexity of specific work covers a wide range of possibilities. Manhours can vary from the threshold of 80 to several thousand. Material can vary from nothing as in the case of an earth moving project, to hundreds of items worth many thousands of dollars as in the case of construction or renovation of a large building. One journeyman trade, as in the case of a painting job, or numerous trades, as is

necessary to convert a warehouse into office spaces, can be involved. There may be no engineering required, like the relocation of a functional office from one building to another, or there may be extensive state of the art engineering requirements like energy monitoring systems for several buildings. Equipment support could be limited to journeymen transportation or range from laser levels to asphalt plants, paving machines, and 200-ton floating cranes with pile drivers. The job could be completed by the shops in less than a week or take months depending upon size, complexity, and customer requirements.

Specific work is processed through a series of steps; estimating, engineering, planning, material, and accomplishment. The basic work flow is depicted in Figure 13. The degree and applicability of these steps to each work request depends on the nature of each particular job. However, each PWC organization is structured to accomplish all of these steps. There are individual divisions tasked to perform each function; Planning and Estimating Division, Production Engineering Division, Material Division, and the Specific Work Division.

The customer generates a work request, TF-1, and forwards it to the PWC where it enters the processing system in the Work Programming Control Office (Code 351). The TF-1 is reviewed in order to determine what kind of service is requested and where the work request should be routed. The job is also entered into the PWCMS for reporting purposes.

There are several routes a work request can take as it first enters the PWC system depending on the type of service requested. The work request can be forwarded to almost any department or division which is involved with customer work. For the purpose of this thesis, only those options relating to specific work will be discussed.

The first step is that of estimating. The TF-1 can call for a scoping estimate or a fundable estimate. A scoping estimate is a general, "ballpark" estimate not intended to be detailed or accurate. It is designed to provide the customer with the general indication of how much a particular job will cost. The Screening and Scoping Branch, (Code 431), of the Planning and Estimating Division develops the scoping estimates, in addition to reviewing all TF-1s for sufficient job information. The scoping estimate is sent back to the customer via Code 351 so that the information system can be updated.

If the work request calls for a fundable estimate, which could be for a new job or one which has already received a scoping estimate, Code 351 will forward the TF-1 to the Job Estimating Branch, (Code 432) of the Planning and Estimating Division. The fundable estimate is a detailed estimate of the work requested by the customer. The planners and estimators (P&E) make visits to the job site to determine what tasks must be accomplished to provide the work and under what conditions. Basic material requirements are

also determined. The job scope is identified to sufficient detail to allow estimation of material, equipment, and labor costs. If the job scope is sufficiently clear, the estimate may be offered "fixed price" which means the PWC is willing to accomplish the identified work scope at the stated price, no matter what the final costs may be. If the job requires engineering or if the estimate is above the funding authority of the local commanding officer,¹³ the branch will issue a scoping estimate.

The fundable estimate is forwarded to the customer via Code 351 and the job folder is filed until further action by the customer. The fundable estimate is the basis for the customer funding. The customer can cancel the job, make changes and request a new estimate, or fund the amount of the estimate. Since the customer requests estimates for planning purposes, the customer may or may not intend to fund the job in the near future. Also, the customer may obtain estimates to advise higher authority of a maintenance backlog even though there is no money to fund the work. Since funding can occur immediately, sometime in the future, or never, PWCs recognize the estimate validity only for the fiscal year in which it was issued, or to a stipulated date.

If the job requires engineering services, it will be scheduled by Code 351 into the Production Engineering Division, (Code 420). The scheduling may await customer engineering funds if the total job estimate is over \$10,000. Code 420

provides the design drawings necessary for the shop personnel to accomplish the requested work. The drawings are reviewed and accepted by the customer prior to finalization.

Upon completion of engineering services, the job will be sent back to Code 432 for a fundable estimate. The completed drawings and the fundable estimate are then forwarded to the customer for final consideration of work funding.

Upon funding of the project at the fundable estimate amount, the job package is scheduled into the Job Planning Branch (Code 435) of the Planning and Estimating Division. Code 435 produces the job plan which is a task sequenced series of actions necessary to complete the requested work. The job plan identifies the number and type of trade journeymen required. It lists the equipment and contract support necessary. It also compiles a detailed listing of material requirements. With this detail, a new estimate of the job is made which may now be offered at a fixed price. If no additional customer funding is required, material procurement commences; otherwise material procurement awaits additional funds.

The documentation sent to the customer (fundable estimate, engineering drawings, and job plan) must be reviewed and accepted by the customer. Failure to review or bring problems and discrepancies to the attention of the PWC constitutes tacit approval. If disputes arise over the job scope, method of accomplishment, or cost, negotiation between the PWC

manager and the customer officials may be necessary to resolve the disagreement and reach a solution.

Upon completion of the job plan, Code 351 tentatively sets a start date based on the expected material delivery lead times. As the material is received, or not received, the start date is adjusted. When all the material has been received, the start date is finalized, and the job is sent to the Specific Work Division, (Code 510) of the Maintenance Department for accomplishment. During the accomplishment, the Work Execution Control Officer (Code 352), provides liaison support to the shops.

Upon completion of the job, PWC and customer personnel inspect it for satisfactory completion. Within scope work, deficiencies are corrected by PWC at no additional cost to the customer. Financial close out on reimbursable jobs may require additional funds from the customer.

There are several aspects of specific work processing and accomplishment which must be introduced to provide a complete understanding of the nature of the work. The discussion which follows addresses these items and is based upon the author's personal experience.

1. Specific work goal and response targets.

The PWC mission statement in Chapter II, Section F, is a functional statement indicating PWC activities. It is not a goal statement which communicates top management's aims and policies, or one which can be used to measure effectiveness.

Although there is no standard goal statement published by NAVFACENGCOM, each PWC composes some sort of goal or policy statement which indicates how it intends to pursue its mission. This statement may or may not contain measures of effectiveness or efficiency. A typical statement might read, "provide quality work for reasonable and legal requested service in a timely and economical manner."

The NAVFACENGCOM, operating in the same manner as a corporate enterprise with NAVFACENGCOM representing the headquarters and the PWCs representing the divisions, develops and publishes annual objectives for PWCs. [21] These objectives include such things as: financial indices, such as ratios; retained earnings; budget variances; account receivable analysis; productivity indices, like engineered performance standards; maintenance engineering performance; administrative and personnel support indicators; and response targets.

The specific work response targets for fiscal year 1980 are shown in Figure 14. These targets specify the number of calendar days which each processing step should take. The targets are not stated in rigid terms. These are flexibilities recognized to accommodate certain conditions. These conditions are discussed below.

The response targets are expressed in different completion percentages due to the stochastic and differing nature of the work input. The work requests submissions, and subsequently

PERCENT OF JOBS COMPLETE IN NUMBER OF CALENDAR DAYS

	50	80	95
<u>SPECIFIC WORK</u>			
SCREENING	4 Days	5 Days	7 Days
FUNDABLE ESTIMATE	7 Days	10 Days	14 Days
	11 Days	15 Days	21 Days
TOTAL RECEIPT TO ESTIMATE			
ENGINEERING	14 Days	21 Days	28 Days
PREPARATION OF JOB PLAN	14 Days	17 Days	21 Days
MATERIAL PROCUREMENT			
CONUS	15 Days	30 Days	45 Days
PACIFIC	45 Days	75 Days	120 Days
CONSTRUCTION	Construction Time + 14 Days	Construction Time + 21 Days	Construction Time + 28 Days
CLOSURE FOR FINAL BILLING	7 Days	14 Days	21 Days
TOTAL-FUNDING TO COMPLETION			
WITH ENGINEERING	Construction Time + 64 Days	Construction Time +103 Days	Construction Time +143 Days
CONUS	Construction Time + 94 Days	Construction Time +148 Days	Construction Time +218 Days
PACIFIC			
TOTAL-FUNDING TO COMPLETION			
WITHOUT ENGINEERING	Construction Time + 50 Days	Construction Time + 82 Days	Construction Time +115 Days
CONUS	Construction Time + 80 Days	Construction Time +131 Days	Construction Time +197 Days
PACIFIC			

FIGURE 14. SPECIFIC WORK RESPONSE TARGETS.

the funding, are random and non-uniform throughout the year. The type, size, and the nature of each job varies along a long spectrum. The jobs are not similar and can not be completed in the same timeframe. These variations do not allow the establishment of any reasonable fixed completion response goals.

PWCs are located in the continental United States (CONUS) and in the Pacific Ocean area. Since the U.S. Navy purchase regulations require the purchase of predominantly U.S. materials both for new and existing systems and structures, Pacific Ocean PWCs must use materials originating in the U.S. Due to the increased distance of the supply line, NAVFACENGCOM has established longer response targets for the Pacific PWCs. These larger response times allow for the increased material transportation times from the U.S.

The funding rate varies throughout the year, but is noticeably higher in the fourth quarter of the fiscal year due to increased funding actions by customers to obligate otherwise expiring funds. Near the end of each fiscal year, the work request funding rate increases due to the availability of unexpended or unobligated funds. These funds become available from a variety of sources and reasons such as liquidation of comptroller reserves, procurement cancellations or revisions, and high budget estimates. To accommodate the increased funding rate, or year end dump, NAVFACENGCOM has lengthened the engineering and job plan completion times,

since this surge of funding creates increased workload and longer completion times.

2. Priority system

If the PWC had only one customer and all the work could be quickly accomplished upon receipt, no priority system would be required; however, the PWC has many customers who compete for work processing availability. Work does pile up and backlogs do occur. As an aid to scheduling and processing specific work, a priority system is required.

The NAVFACENGCOM has developed a standardized work priority system corresponding to job accomplishment requirements. The priority system is shown in Figure 15. [20] This priority system relates job urgency to processing precedence. Mission, safety, or command interest jobs receive the highest priorities, whereas routine jobs receive the lowest. In the same manner, job completion dates vary from nondeferable dates for the highest priorities to no completion dates for nonessential, routine jobs. Material procurement priorities¹⁴ are matched to these job priorities.

Although the customer initially sets, and may subsequently revise the priorities, there is a PWC approval process for the two highest priorities. The review and approval steps are employed to reduce and control the number of high priority jobs.

PRIORITY

WORK CLASSIFICATION

- | | |
|---|---|
| A | Critical customer jobs having mission, safety or high command impact requiring specialized handling to ensure that the job is completed by the customer completion date. Jobs must have customer assigned completion dates which normally cannot be deferred. PWC will work overtime, if necessary, to meet customer requirements and charge customers the time rates. Must be approved by Production Officer based on Senior ACE recommendation. Material Priority 7 or higher if certified by customer. |
| 1 | Essential customer jobs having mission or safety impact. Jobs must have customer assigned completion dates which can be deferred after negotiation with the customer if PWC cannot complete the jobs on time with available straight time resources. Must be approved by Senior ACE. Material Priority 7. |
| 2 | Important customer jobs that do not have mission or safety impact. Jobs must have customer assigned completion dates which can be deferred after notifying customer if PWC cannot complete the jobs on time with available straight time resources. Material Priority 9. |
| 3 | Routine customer jobs with customer assigned completion dates which can be deferred if PWC cannot complete the jobs on time with available straight time resources. Material Priority 14. |
| 4 | Routine customer jobs without customer assigned completion dates. Material Priority 14. |

FIGURE 15. PRIORITY SYSTEM.

The higher the priority the faster the work is processed. Priority "A", for example, takes precedence over all other jobs, meaning that other jobs will be halted and put in a hold status until the priority "A" job is completed. Therefore, higher priority jobs cause disruptions in the normal

work request processing flow and these disruptions cause delays for the other jobs. Minimization of the number of high priority jobs is essential to maintain a uniform flow of work and to retain meaning for the lower priorities.

3. Scheduling

The specific work processing steps of engineering, job plan and shop accomplishment are scheduled. This means that the jobs are sequenced and fed into each processing step. The work processing flow is controlled rather than allowing the work to flood each organizational element.

The scheduling process involves the utilization of available resources. Confronted with the situation of workload exceeding capability, an entity uses scheduling to achieve maximum utilization of those resources (people), to achieve work progress in order to meet completion dates, and to provide an orderly flow of work. [23] Scheduling uses the priority system to help in determining which work is scheduled and when it will be accomplished. With the use of records and reports, it also allows quantification of workload and retention of historical data to aid in decision making.

The basic steps of scheduling are simple and can easily be computer programmed. Estimates are made to determine the productive time required to complete each task. These estimates are based on predetermined time standards or individual evaluations based upon historical experience. Then, the amount of available productive time is determined

for each scheduling period. This is done by taking the total time or the number of hours times the number of people, and subtracting anticipated nonproductive time such as sick and regular leave, training, and allowed time. Finally, the job productive effort is matched to available resource productive time based upon job priority.

4. Contracting

PWCs have the ability to contract which allows the accomplishment of work by commercial firms. Whereas a private company matches production to the forecasted sales demand, a PWC attempts to smooth customer demand to meet in-house capability through the use of contracting. Contracting is PWCs' primary means to reduce increased workload. It is utilized for engineering designs and contract packages as well as work accomplishment.

The decision to contract engineering capability usually rests with the head of the Production Engineering Division, Code 420. This decision is made when the workload is considered larger than PWC engineering capability to handle necessary work in a reasonable period of time. The job selected for contract can be administered either by the Code 420, or by the Facilities Engineering Division, Code 101.

The engineering decision is not necessarily easy, because there are tradeoffs and different factors to consider. The benefits of contracting engineering work are: reduction of in-house backlog and potential provision of a more

timely product. The disadvantages can be: more costs for the customer, especially for small jobs; contracting procedures are not quickly completed; engineer's time is still required to "administer" the contract and review the contractor's product; and possible contractor unfamiliarity with Navy standards, regulations, and requirements which can cause time delays.

The tradeoffs listed for the contracting of engineering services also apply to contracting work accomplishment and the preparation of the contract package; however, there is some flexibility associated with contracting. Subject to contract regulations and the stage of the contracting process, work can be pulled back in-house. For example, even if the contract package has been prepared, but prior to the advertisement and award of the accomplishment contract, the work can be assigned in-house for accomplishment.

The timing of the decision to contract varies for each PWC. From the author's experience, the contracting decision is usually made at the time of the issuance of the fundable estimate. This decision normally does not change unless special circumstances, such as a critical shortage of certain trade personnel or a union strike, force a reevaluation of related contract decisions. Also, special requests from the customer or PWC managers may produce decision reviews.

The contracting process is not as simple as telephoning a local firm and directing that the work be done. There are volumes of regulations, called the Defense Acquisition Regulation (DAR).¹⁵ Also, the NAVFACENGCOM has published The Contracting Manual, P-68, which condenses DAR and interjects Navy policy for facilities and service contracts. These guidelines explicitly indicate procedural steps, documentation, timing, and other related matters.

The phases of contract procurement are planning, development of the drawings and technical specifications; awarding, the competitive bidding or negotiation or the contract price and the signing of the contract; controlling, administration and inspection of the contractor's work during the execution of the contract; and the resolution which is the acceptance of the completed work with the final payment to the contractor or termination due to poor contractor performance or government convenience. These phases apply to all three types of contracting actions; engineering, plans and specifications, and accomplishment.

Decisions to contract can be based upon costs, lack of PWC skill or capability, job size, or the reduction of work backlog to increase response. The NAVFACENGCOM has established an objective to contract 30 percent of all specific work. [21]

Each PWC has developed a contracting policy which serves as a guide to making contracting decisions. The

policy identifies who makes the decision and imposes dollar limitations. It also indicates what type of jobs will always be contracted due to the lack of capability or economics. The contracting policy developed by one PWC will probably differ from other PWCs due to the managerial preference, size, capability of each PWC, and the differing contracting environment. A simple contracting policy is shown in Figure 16.

<u>Size of Job</u>	<u>Decision Method</u>
0 to \$10,000	in-house forces
\$10,001 to \$25,000	one individual i.e., (Code 430)
\$25,001 to \$75,000	committee
\$75,001 and over	contract

FIGURE 16. TYPICAL CONTRACTING POLICY.

5. Funding

Specific work is provided to local activities on a reimbursable basis. This means that the customer pays for all specific work received. The amount that the customer pays for in-house work includes the material costs, plus the annual labor rates times the number of direct labor hours employed on the job. The labor rates include direct and indirect costs, such as the costs for the function of estimating, planning, material procurement actions, and other support costs. General and administrative overhead and Production

overhead include internal indirect costs which are charged to those accounts for intra-divisional support rendered by other internal organizations. For example, a portion of the Facilities Engineering Division charge to the customer may include a transportation charge for the provision of transportation to that department by the internal transportation department. Engineering costs for projects greater than \$10,000 are also reimbursable to PWC. Engineering costs for projects less than \$10,000 are funded with separate monies provided by NAVFACENGCOM.

The function of cost estimation is performed for the customers at no cost. However, the customer must fund, or obligate, money prior to the work proceeding to other processing steps. The customer provides the funds to PWC utilizing the appropriate funding document and in the amount of the estimate.¹⁶

The cost estimate may be either cost reimbursable or fixed price. Cost reimbursable means that the customer pays for all the actual costs regardless of the estimate. Differences between the actual and estimated costs must be either funded by the customer in the case of actual costs exceeding the estimated, or returned to the customer in the case of a fund surplus. Fixed price means that PWC will complete the job at the stated price with no customer funding adjustments regardless of the final actual cost. Fixed price estimates are offered only for jobs which have a clearly

identifiable scope. However, due to the resulting advantages such as the reduction of paperwork and final customer encumbrance accounting at funding authorization, NAVFACENGCOM has established an objective of 50 percent of all specific work jobs to be fixed price. [21]

6. Backlog

Specific job workload is evaluated based upon backlog. Backlog in the aggregate is measured in shop days. That is, the number of days it would take the shops to complete all the presently funded work. This funded amount represents work in the in-house accomplishment steps of planning, material procurement, and uncompleted execution.

The aggregate backlog figure is utilized to monitor overall work inputs and to evaluate contracting decisions. It is also used for staffing decisions. The NAVFACENGCOM has established a backlog goal of 150 shop days or less for the end of the third quarter of the fiscal year. [21]

7. Customer actions

The action and responsibility for specific work processing is not totally that of PWC after the work request is submitted. The customer activity performs certain parts of the work flow process. The responsiveness of the customer can and does affect PWC responsiveness. These actions are listed below in order of the work flow:

- a. Providing sufficient information in a timely manner to allow the determination of the job scope and the cost estimate.

b. Reviewing the fundable estimate to verify that what work is estimated is that which was requested or desired.

c. Funding the estimates; fundable estimate for the work accomplishment and engineering for the design, if applicable.

d. Providing more detailed information, as well as allowing PWC personnel to view the job site to allow the design and/or planning to be completed.

e. Reviewing the design and/or the job plan to ensure the detailed work tasks are compatible to what was requested or desired.

f. Minimizing changes of job scope throughout the planning or estimating phases by ensuring clear formulation of what is desired.

g. Funding any price variations as applicable.

h. Allowing access to the job site for PWC forces or contract personnel to accomplish the work.

i. Inspecting and accepting the completed work.

j. Funding any final price variations as applicable.

k. Notifying PWC of any problems, during the first year of operation, governed by the warranty and providing proper and required maintenance.

K. SUMMARY

The Navy Public Works Center is an organization formed as a result of the consolidation of Public Works Departments. It provides a wide range of public works services to a

geographical area and many commands located therein. The economies of scale resulting from the consolidation action outweigh any disadvantages. Although the mission of the PWCs has not changed, the organization and management system have seen major changes in an effort to provide more effective and efficient service. The specific work processing flow has likewise undergone changes. Specific work incorporates a wide spectrum of types and sizes of jobs. Contracting is utilized to supplement the PWC capability and achieve economies as well as reduce backlog. Specific work processing has many features which either aid or restrict the work flow. Problems associated with the work flow and information needs will be discussed in the next chapter which addresses the results of the PWC survey.

III. SPECIFIC WORK SURVEY

A. INTRODUCTION

As discussed in Chapter II, the nature and characteristics of specific work service provided by Navy Public Works Centers (PWC) are not homogeneous, but vary from one job to another. Specific work includes a wide range of job sizes and job types. The projects are submitted to a PWC on a random basis throughout the fiscal year by many different customers within assigned geographical areas. The jobs may or may not require extensive planning, or material, equipment, and labor resources. Such characteristics can create work flow processing and response problems regardless of the management system employed.

During a recent military tour at one PWC, the author was involved in work flow processing and response problems associated with specific work. Continuing management effort pursued the identification and resolution of response problems. The large amount of time and effort that the author and the other PWC managers expended originated the idea to investigate specific work processing problems as a thesis topic.

This chapter presents the author developed questionnaire survey conducted to determine if other PWCs were experiencing similar specific work problems as those observed by the author. It discusses the author's experience and the observed specific work response problems. It explains the survey methodology and presents the returned questionnaire information.

The chapter concludes with a summary of the resultant specific work problem areas.

It is noted from the onset that differing site conditions and operating environments at each PWC can produce incompatible answers, which precludes any generalized summary statement about all PWCs. The author has analyzed the questionnaires with this aspect in mind, and has eliminated those questions and responses not considered applicable for generalization.

B. THE AUTHOR'S EXPERIENCE

As stated earlier the idea to investigate specific work response problems originated during the author's military tour of duty at one PWC. The author was in charge of the customer liaison function, i.e., the Activity Civil Engineer Office. The office assisted the customers with work identification, the preparation of work requests for submission to the PWC, and acted as liaison for the PWC on work processing and accomplishment. In the liaison function, the author was involved in both the providing and receiving of PWC service. Although the customer liaison duty applied to all PWC services, more than 80 percent of the author's time was devoted to specific work which constituted approximately 16 percent of the total dollar volume of business.

This amount of time resulted from both the nature of specific work and the other PWC services. The other services, although greater in the aggregate dollar volume of business,

were requested and provided on a much smaller case-by-case basis. Little coordination or planning was required. For example, emergency-service or minor work required minimal materials and planning with all of the liaison handled directly over the telephone. Also, services such as utilities and recurring maintenance required one time annual coordination effort after which the service was routinely or periodically provided without additional customer liaison effort.

Specific work, however, was a different case. First, individual specific work jobs comparatively involved much greater sums of money. Second, these funds came from limited local activity resources which were usually far short of the total required for real property maintenance activities. Third, specific work was usually related to the local activity's operations. Fourth, the jobs required a series of planning and processing steps which took considerably more time than other work and required customer actions. These characteristics meant that specific work maintained high customer visibility and interest.

The author's involvement in specific work entailed three types of actions: first, representing the customer interests within the PWC; second, coordinating the PWC work processing with the customer; and third, participating in PWC studies and investigations to improve specific work processing response.

In representing the customer interests at PWC, the customer liaison office formed the tie between the producer and

the receiver. The office was the PWC point of contact for the customer to express concerns as well as to seek assistance in processing specific work. The types of actions with which the author became involved included: coordinating initial meetings to plan work; establishing job processing schedules; monitoring job progress; ensuring timely actions on customer work; expressing customer interests at job scheduling and status meetings; investigating scheduling delays; reporting timely and accurate job status to customers; ensuring that job planning included special considerations such as design criteria or functional requirements; assisting in the continual flow of customer work; coordinating material substitutions; changing project requirements or schedules as operating conditions warranted; and coordinating processing problems to resolve work stoppages. Such actions kept the PWC liaison office constantly involved with the customer's specific work complaints, and involved with the details of specific work processing.

On the other hand, the customer liaison office pursued PWC concerns with the customer. These concerns involved the obtaining of job information and timely customer actions or decisions. Specific duties in this regard included: assisting in the provision of timely, accurate, and complete customer information on job scope and requirements; monitoring assignment of proper job priorities as well as changing priorities to meet job demands; assisting the customers in

estimate, design, job plan, and completed work reviews; coordinating follow-up changes resulting from these reviews; monitoring timely customer funding; coordinating site visits; resolving job interference problems; coordinating contracting decisions with the customer; and aiding in customer decisions on functional and material desires. Such actions were aimed at obtaining the necessary information from the customer so the PWC could complete job planning and accomplishment.

The third major effort in specific work processing was the participation in PWC studies and investigations to improve processing response. Although the PWC responded quickly to priority "A" specific work requirements, lower priority work response did not usually meet PWC or customer expectations. Numerous studies and investigations were conducted to identify response problem areas and to determine corrective action. The author participated in many of these undertakings. Improving specific work response was a perpetual goal which, in the author's opinion, was never resolved to the satisfaction of all parties concerned.

The customer liaison duties kept the author continually involved with specific work problems. Many of the corrective actions provided short range solutions, but they did not provide permanent resolutions to the problems. This situation motivated the author to conduct a survey with all the PWCs to determine if other PWCs were experiencing similar problems.

C. SURVEY METHODOLOGY

In developing a survey of specific work response problems, certain considerations had to be taken into account. First, the questionnaire had to reach those PWC managers most directly involved in specific work processing so that the best information could be obtained. Second, the receivers of specific work had to be surveyed since their expectations concerning response were important. Finally, the questionnaire had to be general enough to apply to all recipients, yet sufficiently detailed to obtain specific comments on response problems.

The PWC managers most directly involved with specific work processing were selected to be survey participants. This meant the Production Group and the Production Management, Maintenance Engineering, and Maintenance Departments. Since the specific work processing system was not unlike an assembly line with each organizational element performing its own assigned task, the questionnaire had to reach the managers in each phase of work processing. For this reason, the department heads and division directors were selected for the survey. In addition, the Production Officer was included for a top management viewpoint. Also, the Senior Activity Civil Engineer was selected for the close association with the customers. Accordingly, eleven PWC managers were selected for the survey: Codes 30, 350, 351, 352, 400, 420, 430, 450, 500, 510, and 110. These are presented in Figure 17 with their applicable titles.

<u>Code</u>	<u>Title</u>
30	Production Officer
350	Production Management Department Head
351	Work Programming Control
352	Work Execution Control
400	Maintenance Engineering Department Head
420	Production Engineering Division Director
430	Planning and Estimating Division Director
450	Material Division Director
500	Maintenance Department Head
510	Specific Work Division Director
110	Senior Activity Civil Engineer

FIGURE 17. PWC MANAGERS SURVEYED.

The customers' perceptions were desired since they were a measure of PWCs effectiveness in achieving the basic mission and satisfying the customers' needs. Only major PWC customers, those local activities which had Staff Civil Engineer Officers (SCE), were used in the survey to simplify the data gathering process. A total of forty-two such offices were identified. These offices are listed in Appendix A.

Each PWC varies somewhat from others in organization and operating procedures. For this reason, the questionnaire had to balance detailed questions against general applicability. A question too specific may not apply to one or more PWCs, whereas a question that was too general, would not elicit

meaningful information. To achieve a balance, the questionnaire was individually tailored to each particular manager with certain common questions directed to all recipients.

Broad topic areas of concern were identified. These included basic subjects relating to specific work such as response targets, priorities, customer actions, backlog, and each phase of the processing procedure. For each subject area, specific questions were written relating to potential problem areas and corrective actions. These questions were specified for particular managers or general applicability. The individual questionnaire were then formed for each recipient by selecting what the author considered the most relevant questions.

The specific questions were a mix of multiple choice questions and open ended questions. Multiple choice questions focused on specific issues. The open ended questions allowed the recipient to explain answers and to offer individual comments. The completed questionnaires are presented in Appendix B.

The proposed questionnaires were reviewed by the author for acceptance and conformance to established survey techniques. Also, local Naval Postgraduate School personnel familiar with PWC operations were requested to review and comment on the questions. In addition, the questions were tested using PWC, San Francisco Bay managers as the control group. As a result of these actions, many constructive changes were made to the questionnaire.

D. SURVEY RESULTS

Figure 18 shows a summary of the returned questionnaires. Twenty-five, or 60 percent, of the forty-two SCE questionnaires were returned. Seventy-one, or 81 percent, of the eighty-eight PWC manager questionnaires were returned. The summarized responses are contained on the sample questionnaires in Appendix B.

<u>PWC Code</u>	<u>Number</u>
30	8
350	6
351	7
352	3
400	8
420	6
430	7
450	8
500	6
510	4
110	<u>8</u>
	71
SCE	<u>25</u>
	96

FIGURE 18. SUMMARY OF RETURNED QUESTIONNAIRES.

All of the respondents were asked to list what they considered to be the top five specific work processing problems. Figure 19 presents a condensed summary of these responses. Items with fewer than four responses are not included.

<u>Item</u>	<u>Number of Responses</u>
Material	61
Customer liaison/actions	46
Job plan liaison/actions	24
Engineering	22
Scheduling	21
Personnel staffing/constraints	15
Supervision	10
Priority work	10
Reports	10
Planning system	7
Funding	7
Paperwork	6
Management	5
Backlog	5
Shop accomplishment/variances	5
P&E/shop communication	5
Transportation support	5
Regulations/constraints	4
Estimating	4
Priority system	4

FIGURE 19. SPECIFIC WORK PROCESSING PROBLEMS.

The problems noted address most aspects of specific work service. The problems included all job processing phases from work input to shop accomplishment. Intermediate actions such as scheduling, funding, and customer scope changes were also included. Material procurement, and the associated action as receipt, delivery, and inventories, were considered by far the biggest problems. The other major problems were

customer actions, customer liaison, job plans, scheduling, and personnel staffing.

Figure 20 summarizes the answers to the question which asked the respondents to identify the work flow bottlenecks. Material procurement again received the greatest number of votes from both the PWC managers and the SCEs. The PWC managers and the SCEs differed as to the sequence of the bottlenecks following material procurement. PWC managers named scope changes and amendments, engineering, and funding as the next bottlenecks. The SCEs named engineering, scope changes and amendments, and job plans respectively. Other bottlenecks added to the list presented by the question were equipment, poor customer planning, variances, paperwork, and hiring personnel. Both the PWC managers and the SCEs top responses matched their responses to the prior question.

These two questions provided the respondents' general assessments regarding the specific work response problems. The other survey questions and responses will be presented in the remaining part of this section. The responses are grouped under the following subheadings: engineering, material procurement, job plan, shop accomplishment, scheduling, backlog, contracting, customer actions, response targets, and corrective actions. Further reference will be made to the initial questions in each respective topic.

PWC Code	Fundable Estimate	Funding	Engineering	Job Plan	Material Procurement	Shop Work	Contract Specifications	Scope Changes/Amendments
30	3	3	5	3	7	0	2	2
351	1	3	2	3	6	2	2	3
352	0	2	0	0	3	1	0	1
400	3	5	6	3	8	3	3	5
500	0	1	2	2	5	0	0	4
510	$\frac{1}{8}$	$\frac{0}{14}$	$\frac{0}{15}$	$\frac{1}{12}$	$\frac{3}{32}$	$\frac{0}{6}$	$\frac{0}{7}$	$\frac{3}{18}$
SCE	$\frac{8}{16}$	$\frac{2}{16}$	$\frac{19}{34}$	$\frac{6}{18}$	$\frac{24}{56}$	$\frac{4}{10}$	$\frac{8}{15}$	$\frac{7}{25}$

FIGURE 20. SPECIFIC WORK PROCESSING BOTTLENECKS.

1. Estimating

Estimating was not named frequently as a work processing problem. Only four respondents considered estimating to be one of the top five problems. As a work processing bottleneck, however, the PWC managers ranked the fundable estimate sixth. The SCEs ranked the fundable estimate in a tie for third with contract specifications.

Sixty percent of both the SCEs and the PWC Code 430s thought that the scoping estimate served a useful purpose and should not be eliminated. Almost all of these respondents indicated that scoping estimates could be expedited by handling them over the telephone vice providing a written estimate. The planner and estimator (P&E) manyyears of effort, devoted by PWCs to scoping estimates, varied from one to four.

The length of time to produce a fundable estimate was not considered a problem. Figure 21 shows the PWC manager responses when asked if the fundable estimate takes too long to produce.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	3	5
351	3	3
430	<u>1</u>	<u>6</u>
	7	14

FIGURE 21. DOES PWC TAKE TOO LONG TO WRITE
A FUNDABLE ESTIMATE?

Two-thirds of the managers responding said that PWC does not take too long to produce a fundable estimate. No code as a group said the time was too long; however, the Code 351s were undecided. Although the same question was not presented to the SCEs, no SCE indicated that the length of time was a problem. One SCE desired a higher degree of fundable estimate accuracy.

The amount of P&E effort required to write a fundable estimate is influenced, among other things, by the amount of scope definition which is needed to provide a reasonable estimate. The survey showed that P&Es frequently helped the customers in determining job scope. The Code 400s said that a considerable amount of P&E time was devoted to scope definition rather than estimating the cost. The Code 430s agreed. About half of the SCEs said that more assistance was desired from PWCs in scope definition. Just over one-third of the SCEs also said that more assistance in work identification was desired. While reducing the P&E effort in scope definition would expedite the estimating process, work identification and scope definition appear to be a valuable service to the SCEs.

The PWC standard organization shows that different P&E branches write the fundable estimate and the job plans. Although there may be close coordination and the transfer of P&Es between the two branches, the same P&E does not necessarily write both the fundable estimate and the job plan.

Job familiarization can therefore be required for both work phases. Figure 22 shows the responses to the suggestion that the fundable estimate be written so that it becomes part of the job plan, eliminating duplicative job familiarization.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
400	4	4
430	<u>5</u>	<u>2</u>
	9	6

FIGURE 22. SHOULD THE FUNDABLE ESTIMATE
BECOME PART OF THE JOB PLAN?

The Code 400s were undecisive. The Code 430s were in favor of writing the fundable estimate so it became part of the plan. The implementation of this suggestion might require changes to the job plan structure. Benefits would result only if the total amount of P&E effort was reduced. The issue would require further study. One Code 430 did note that the same P&E was assigned to write both the fundable estimate and the job plan for the purpose of improving response and productivity.

2. Engineering

Specific work engineering is not required for every job, but only for those involving facility construction or alteration and equipment installation projects. Engineering personnel are also used to support the P&Es with consultation when writing the job plan. When engineering is required,

it is perceived as a problem. Engineering was the fourth most frequently named specific work processing problem after material procurement, customer liaison and actions, and job plans. As a workflow bottleneck, the PWC managers ranked engineering third, whereas the SCEs ranked it second. The PWC Codes 30 and 400 strongly considered engineering a problem. The comments made concerning engineering problems were nonpractical designs, unnecessary design, layout rather than actual design, too much use of detailed drawings rather than sketches, overdesign, poor engineering manhours estimates, and time of completion.

Figure 23 shows the survey results concerning engineering time of completion.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	4	4
350	5	1
351	2	5
400	4	4
420	<u>1</u>	<u>5</u>
	16	19
SCEs	<u>21</u>	<u>3</u>
	37	22

FIGURE 23. DOES ENGINEERING TAKE TOO LONG?

Overall, the consensus of opinion was that engineering took too long. This result was strongly influenced by the SCEs who almost universally agreed that engineering took too long.

The PWC managers were slightly inclined to disagree. These PWC responses varied from almost complete agreement to almost complete disagreement. Obviously, the managers position affected the perception of the engineering response. Certainly, however, the responses demonstrate that the customers' expectations were not being met.

One factor which can influence the time required to complete engineering designs is the degree of detail which is incorporated into the design. Figure 24 shows the responses about the degree of engineering design.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	5	3
350	5	1
351	1	5
400	3	5
420	2	7
500	0	4
510	<u>1</u>	<u>5</u>
	17	30
SCEs	<u>14</u>	<u>11</u>
	31	41

FIGURE 24. DOES PWC OVER-DESIGN ENGINEERING?

Overall, the respondents said that engineering did not overdesign. Fifty-seven percent indicated that overdesign was not a problem. Fifty-six percent of the SCEs said that overdesign was a problem, whereas 36 percent of the PWC

managers agreed. The PWC responses can be factored by function. The managers who oversee and monitor engineering, Codes 110, 350, and 351, generally considered overdesign to be the case. Sixty-four percent indicated that overdesign was a problem. For the designers, Codes 400 and 420, 29 percent agreed that overdesign was a problem. On the other hand, only 10 percent of the users, Codes 500 and 510, said that overdesign was a problem. While the managing and receiving parties thought overdesign was a problem, the producers and the products users indicated that the product was satisfactory to get the job done.

The engineering design specifically establishes the end product and in doing so, determines the quantity and type of materials to be used. It also can determine the time of completion for the particular job. Fifty percent of the Code 420s agreed that the cost and time of completion were specified by the design. The Code 420s indicated that experience, cost comparisons, value engineering, and the extent of the work were used to minimize job cost and completion times. One Code 420 said that minimization of cost and time of completion results in a less than optimum design.

Engineers can specify different types of material to satisfy design specifications. The engineers did specify readily available material vice material with long lead times. The Code 420s said that the engineers were aware of and required the use of readily available materials. The Code

450s agreed that readily available material was usually specified in the designs.

Although every job does not require engineering, engineering backlog can accrue for a variety of reasons. Nonuniform work input, job size, job complexity, and engineer hiring problems are examples of such reasons. Engineering backlog can be relieved with the use of contracting. Half of the Code 420s said that they did not have backlog targets at which point design contracting would be increased to improve response. Of those two Code 420s who did have targets, the targets were four and twelve weeks of backlog.

The Code 420s were unanimous concerning contracting design work. They objected to such action due to poor contractor performance, the amount of time involved, and the engineer review time required. The Code 420s also unanimously felt that the customers preferred in-house designs. Although the SCEs did prefer in-house work to contract they recognized that the constraints facing the PWC mandated more contract work. The SCEs suggested that more design work should be automated, value engineering should be used more, and more design work should be contracted to reduce the backlog. The actions taken by PWC managers to increase engineering response included more contracting of design work and increased use of open-ended design contracts.

The Code 420s noted that nonproductive duties interrupted productivity. These interruptions included administrative

duties, paperwork, and engineering service investigations. Estimations of the percentage of nonproductive engineers' time ranged from three to twelve with an average of seven. The Code 420s also indicated that approximately 15 percent of the engineers time was devoted to consultation.

Actions taken by the Code 420s to improve response were to monitor job progress especially the priority work, defer or contract routine jobs, use overtime, review work input, and enforce design manhour estimates. Other actions included hiring experienced engineers, improving paygrades, utilizing more draftsmen, and improving as-built drawings. Additional actions which the Code 420s said could improve their response were improved working conditions, use of flexitime, better customer planning, better P&E skill, and designing one the work which is already funded.

3. Job plan

As a specific work problem area, job plans were ranked third by the respondents. Twenty-four of the respondents considered job plans to be problems. The majority of the votes came from the PWC managers who work with the finished product; Codes 110, 500, and 510. They felt that with improved planning follow-on problems such as scope changes and amendments as well as incorrect material items could be reduced or eliminated. Other comments stated that planning was complicated, lengthy, and lacked required amount of coordination. The SCEs did not specify job plans as a problem, but they

did feel that overall planning could be improved. As a processing bottleneck, job plan ranked fourth overall. The SCEs ranked job plan sixth, whereas the PWC managers ranked it fifth.

Figure 25 shows the responses concerning the length of time to produce a job plan

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	3	5
350	4	2
351	3	4
400	3	5
430	<u>1</u>	<u>6</u>
	14	22
SCEs	<u>16</u>	<u>9</u>
	30	31

FIGURE 25. DOES PWC TAKE TOO LONG TO PRODUCE A JOB PLAN?

The respondents in the aggregate were undecided about the length of time required to produce a job plan. Splitting the responses between the PWC managers and the SCEs, however, indicated differing opinions. Sixty-four percent of the SCEs said that job plans take too long to produce. The PWC managers, on the other hand, generally disagreed. Sixty-one percent said that job plans did not take too long to produce. Only the Code 350s indicated that job plans took too long. The Code 430s almost universally disagreed with the SCEs and the Code 350s. The other PWC managers generally agreed with

the Code 430s. Although these responses did not indicate complete agreement, they did emphasize a difference of opinion between the PWCs and their customers.

The length of time required to write a job plan is related, among other things, to the degree of planning accomplished. When asked if too much detail was provided in the job plan, the PWC managers said that the job plan was adequate to get the job done. Figure 26 presents these responses.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>	<u>Needs more</u>
110	3	4	1
350	2	2	2
351	1	3	3
352	0	3	1
400	5	3	0
430	2	5	0
500	1	4	1
510	0	0	4
	<u>14</u>	<u>24</u>	<u>12</u>

FIGURE 26. DOES THE JOB PLAN HAVE TOO MUCH DETAIL?

Fourteen of the PWC managers said that job plans were overplanned. Twenty-four said that job plans were satisfactory. Twelve, however, said that more detail should be provided in the job plan. The Code 510s, the managers who execute the job plan, unanimously desired more detail. Some of the supporting or monitoring managers also indicated that more

detail was required. The Code 430s felt that the job plan detail was adequate. Only the Code 400s said that there was too much detail.

When asked a similar question, the SCEs indicated that the job plan was adequate. Sixty percent said that job plans were not overplanned.

Another factor which affects the time required to produce a job plan is the number of field visits the P&Es make to the work site. These trips can be time consuming when the PWC serves a large geographical area. Figure 27 presents the response when certain managers were asked if the P&Es make too many field visits.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	0	5
400	0	8
430	<u>0</u>	<u>7</u>
	0	20
SCEs	<u>4</u>	<u>20</u>
	4	40

FIGURE 27. DO THE P&ES MAKE TOO MANY TRIPS
TO THE JOB SITE?

Only four of the forty-four respondents thought that P&Es make too many trips to the work site. These were all SCEs. The PWC managers unanimously said no. As one SCE put it, "the P&Es should make as many trips as necessary to obtain the required information."

There were not very many written comments made concerning job plan problems or corrective actions. The five respondents who did mention something said that shop and P&E communication required improvement. One SCE said that job plans should be less detailed to give the shop journeymen flexibility to utilize their trade skills. Only one SCE noted that job plan response was a problem.

The Code 430s were asked what actions could be taken to improve their response. They listed improve work input information, improve scheduling, better inspection reports, eliminate variances, reduce material problems, and better equipment inventory files.

4. Material

Material procurement with its associated actions was clearly named as the biggest problem hindering specific work response. As indicated at the beginning of this section, material was the most frequently stated problem of all specific work areas. Both the PWC managers and the SCEs placed material at the top of the list. When asked if they agreed that material was the biggest problem, two-thirds of the PWC managers agreed. Several managers who disagreed said that material was just one of many. Only the Code 450s as a group disagreed. They indicated that material was perceived as the biggest problem since it is the last step before shop accomplishment; it takes the longest of all phases to complete; and

material problems result from poor engineering, planning, and workmanship as well as noncompliance with the job plan.

As a work processing bottleneck, material procurement headed the top of the list. Almost every respondent cited material procurement as a bottleneck.

The most frequently stated reason for material procurement problems was the lack of flexibility at the local PWC level. Restrictive procurement regulations was the predominantly cited factor both by the PWC managers and the SCEs. Other constraining factors noted were low purchase authority, limited ability to make local purchases, and low blanket purchase authority. The Code 450 blamed inflexibility on uncontrollable external factors. The factors were reliance on vendors for accurate information and deliveries, delivery delays, delivery of material not meeting specifications, and the reliance on middlemen procurement organizations such as a Naval Supply Center.

The Code 450s stated that many of their problems were caused by others. Poor or sloppy work during the engineering, planning, and accomplishment phases were reflected in additional or changed material requirements. The examples provided by the Code 450s included poor customer planning in terms of scope definition and work completion times required, poor PWC planning resulting in inaccurate or incomplete material requirements, poor material specifications, procurement system circumvention, invalid job scheduling, unrealistic

material demands, and unplanned purchases. Factors such as these caused disruption of efficient operations and extra effort for material personnel.

The Code 450s agreed with the P&Es and the engineers that designs and job plans reflected material which was readily available such as that carried in shop store inventories. They felt the P&Es and engineers were aware of what material items were stocked and regularly specified this material in the designs and job plans. Only two Code 450s disagreed and indicated that shop store material was not normally utilized.

The number of items and the quantity of those items carried in shop stores was an issue which was mentioned by several of the respondents. Several of the PWC managers said that material procurement response could be increased by increasing the material inventories. They suggested increasing both the number of items and the quantity of those items. Six of the seven Code 450s responding agreed that the number of line items stocked should be increased. Only three of the same seven thought that the quantity of the items carried should be increased. Only twenty-five percent of the Code 450s indicated that many "not in stock" situations occurred. Two of the eight Code 450s use economic order quantity models to determine how much stock should be carried and when the orders should be placed.

Equipment specialists in the Material Division or P&Es in the Planning and Estimating Division estimated the material

lead times for deliveries based upon experience or vendor information. These lead times were used to establish the job accomplishment start date. Delays in material delivery produced corresponding delays in job start dates.

When asked what can be done to reduce or eliminate job start slippages due to material nonavailability, Codes 350, 351, and 400 listed provide better lead time estimates, more customer liaison, better planning, more material inventory, improve follow-up, make material substitutions, and increase PWC purchase authority. The Code 450s suggested similar type actions plus better use of material status reports, procure material sooner, use realistic requirement dates, and prioritize planned work.

The Code 450s provided diverse answers when asked what actions could improve lead time estimates. The answers were: staff the Material Division with adequate numbers of people; level the workload throughout the year; expedite outstanding orders; employ realistic material requirement dates; closer job processing coordination; and delay shop loading until the material was in transit.

The Code 350s indicated that jobs were frequently started without all the material onhand. Waiting to start a job until all the material was available was suggested by several PWC managers to reduce material problems and job start slippages.

Such action might reduce the number of material problems in the field, but it might also increase overall job response and would not reduce job start reloading.

When asked what the main obstacles were to responsive material procurement, the Code 450s stated poor material specifications, poor sole source justification, paperwork, the grouping of material purchases, low purchase authority, shortage of personnel, lack of local sources of supply, procurement regulations, delivery times, and the economy. These responses reflected the lack of material flexibility to provide material by the fastest means possible.

There were many suggestions from the PWC managers to improve material response. The issue of increasing local procurement flexibility involved the greatest number of suggestions. These included changing the procurement regulations, increasing procurement authority, allowing more local purchases, and obtaining better support from other material support commands. Suggestions involving PWC actions were to increase the number and quantities of items stocked, to increase the number of buyers, to improve material specification, to utilize more supply contracts, and to improve planning. Various other actions were suggested such as employing inventory models, better and closer follow-up, advance procurements, standardizing material purchases, and enforcing the use of the shop store material.

5. Shop accomplishment.

Shop accomplishment was not identified as a significant specific work problem. Only two of all the respondents named it as one of the top five problems. As a work processing bottleneck, the PWC managers ranked it as the last items of those presented in the question. The SCEs ranked it next to the last, just before customer funding. The fact that the work has finally made its way through the planning and material procurement, and was underway was considered definite progress. Also, progress was visible in that on-site work was being accomplished.

There are, however, problems associated with shop accomplishment. Just over 50 percent of the SCEs and all of the Code 352s indicated that shop accomplishment did not proceed smoothly. The reasons noted included material problems such as shortages, nonavailability, and incorrect specifications, inaccurate job plans, low manpower, poor workmanship, customer interference and changes, and schedule interruptions. All preparation effort comes into play when the work actually begins. Any discrepancies originated from prior processing actions and the workmen's must be resolved during shop accomplishment to provide a satisfactory end product.

Some of the problems encountered during shop accomplishment can cause work stoppages. Figure 28 shows the Codes 500 and 510 explanations for work stoppages.

<u>Item</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Hardly ever</u>
Field changes	2	1	1
Unforeseen conditions	3	0	0
P&E error	1	0	0
Material non-availability	7	3	0
Material incorrect	4	5	1
Customer interference	1	9	0
Manpower non-availability	0	8	2
Priority work	2	5	3
Equipment non-availability	4	4	2
Design error	0	8	2
Additional funding	0	5	2
Variances	1	0	0
Worksite availability	0	1	0

FIGURE 28. REASONS FOR SHOP ACCOMPLISHMENT STOPPAGES.

Material problems headed the list for reasons of field work stoppages. Material nonavailability received the greatest number of votes. This implied that jobs were frequently started without material being on hand. Equipment availability, another support element like material external to the Maintenance Department, was also identified as a frequent work stopper.

Shop accomplishment variances, deviations from the job plan in terms of material and labor requirements, can be

troublesome and timeconsuming. Although they indicated that variances did not stop the work very often, half of the Maintenance Department managers indicated that a significant amount of time was devoted to them. The Code 352s likewise indicated that much time was spent with variances. The P&Es and engineers, however, did not get very involved with them. The Code 352s said that better job planning and more timely and visible cost information would help to eliminate variances.

Field amendments, changes to the job scope after the work commences, can result from unforeseen conditions and changes in the customers requirements. Codes 352, 500, and 510 indicated by 11 to 2 that there were many field amendents. These same managers said that while some result from unforeseen conditions most could have been resolved by the P&Es and better planning. Figure 29 shows the responses to this question.

Are there many amendments after the job starts?

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
352	2	1
500	5	1
510	<u>4</u>	<u>0</u>
	11	2

Who should have prevented the problem?

<u>PWC Code</u>	<u>Customer</u>	<u>P&E</u>	<u>Engineer</u>	<u>Nobody, unforeseen</u>
352	0	1	0	1
500	0	3	0	1
510	<u>0</u>	<u>2</u>	<u>0</u>	<u>2</u>
	0	6	0	4

FIGURE 29. SPECIFIC WORK AMENDMENTS.

In accomplishing specific work, the Maintenance Department felt that it needed P&E and engineer assistance, but that this assistance was not easily obtained. Figure 30 shows the Codes 500 and 510 responses to the questions about field assistance.

Field assistance is needed?

<u>From</u>	<u>Never</u>	<u>Sometimes</u>	<u>Frequently</u>
P&E	1	5	4
Engineer	2	8	0

Field assistance is obtained?

<u>From</u>	<u>Easily</u>	<u>With effort</u>	<u>Hardly ever</u>
P&E	3	5	2
Engineer	2	3	5

FIGURE 30. FIELD ASSISTANCE

Field assistance can be important in resolving interpretations of job plans and design, material substitutions or adequacy and unforeseen conditions. This assistance could make the difference between a work stoppage or poor quality and faulty work. This assistance must, however, be balanced against the loss of planning productive time.

Faulty work can among other things require rework, or performing the work again to correct deficiencies. Rework can require additional material and much time. Codes 352, 500 and 510 almost unanimously agreed that rework was not the responsibility of the shops. These same managers claimed that

better planning, in terms of scope definition and job requirements, would minimize the costly and time consuming rework. The author reminds the reader that P&E and shop communication, although it received only five votes, was singled out as a specific work problem area.

Some of the actions which the Maintenance Departments were taking to improve response included establishing or increasing the use of project managers, realignment of the workforce, improve field supervision, modernization of equipment and work methods, enhancement of employee attitudes, rejection of poor job plans, and more customer liaison.

6. Scheduling

Scheduling ranked fifth as a top specific work problem. With the exception of the SCEs and the Code 30s, the PWC managers who received work via the scheduling process named it as a problem area. These codes were 400, 420, 430, 450, 500, and 510. The reasons noted for the problems were overscheduling, starting jobs without materials, schedule changes, schedule inaccuracy, inaccurate completion times, and amount of associated paperwork. The SCEs disliked the number of schedule changes and delays which occurred.

The accuracy of the scheduling process is partly based upon the manpower projections which are used to determine the amount of work to be scheduled. Figure 31 shows the Code 351s assesment of the manpower projections which they receive for scheduling.

<u>Projection</u>	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Hardly ever</u>
P&E	1	4	2	0
Engineers	1	4	2	0
Journeyman	<u>1</u>	<u>3</u>	<u>3</u>	<u>0</u>
	3	11	7	0

FIGURE 31. HOW ACCURATE ARE MANPOWER PROJECTIONS?

One-third of the responses indicated that the manpower projections were sometimes accurate whereas 54 percent indicated that they were frequently accurate. Only 14 percent stated the projections were always accurate. All three types of projections had the same relative degree of accuracy.

Another key element of scheduling is the manhour estimate to accomplish the particular action. With the exception of the Code 420s, the PWC managers did not indicate that workload estimations needed to be improved. The Code 420s said that the engineering manhours estimated for design work did not truly reflect the engineering requirements.

The PWC managers indicated that the schedule plan was regularly compared to the actual results. For example, 80 percent of the Code 420s compared the planned output with the actual. Also, five of the seven Code 430s made similar comparisons. Such comparisons provided the basis to evaluate and change, if necessary, the manhour estimates for scheduled work.

Shop accomplishment schedule changes occurred often in the author's experience. These start date changes resulted from several factors. Figure 32 shows the Code 351s responses identifying the reasons for job start delays.

<u>Item</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Hardly ever</u>
Equipment	1	3	3
Material	4	3	0
Manpower	1	5	1
Priority work	1	6	0
Customer amendment	0	5	1

FIGURE 32. WHAT ARE THE REASONS FOR JOB START SLIPPAGES?

Material took first place as the most frequent cause of job start date slippages. Although in-progress work was stopped frequently for equipment nonavailability, it did not frequently delay job starts. The manpower delays were not consistent with the same Code 351s assessment of shop manpower projections; unless those projections underestimated the manpower.

The PWC managers' suggestions to reduce or eliminate job start slippages due to manpower availability were to use more overtime; to use more temporary employees; to increase the number of shop personnel; to stop overscheduling; to contract more; to reduce the number of priority jobs; to improve planning and scheduling; to reduce the number of customer changes; to enforce the shop schedule; to improve

shop supervision; and to stabilize the workforce.

Suggestions to improve the scheduling process vary. The Code 420s wanted to see less overscheduling and better man-hour estimates. The Code 430s desired enforcement of the priority system and better P&E discipline/individual scheduling. The Code 500s wanted more control and flexibility over their schedules, and better task sequence sheets. While one Code 510 said that no changes were necessary, most also desired more control over their schedules.

7. Backlog

The backlog of funded work is measured by the number of shop required to accomplish this work. This unit of measure was considered valid by 74 percent of the respondents. Only work center manhours was suggested as a better measure by two of the PWC managers.

The backlog profile for any fiscal year generally follows a decreasing trend for the first three quarters, and a significantly increasing trend for the last quarter due to the years end dump. Five of the six Code 350s indicated that a large year end funding dump was experienced each year. Only half of these managers considered the year end project funding to be a problem, but all six felt that delays in response resulted. Other PWC managers, Codes 400 and 500, agreed that response delays resulted from the year end projects, and also felt that better customer planning could eliminate some of the associated problems. Figure 33 shows the summary of these responses.

<u>Item</u>	<u>Codes</u>	<u>350</u>	<u>400</u>	<u>500</u>	<u>Total</u>
Results from poor customer planning		3	5	5	13
Causes response delays		6	8	3	10
Allows workforce balancing		1	2	1	4
Is not a problem, no response effect		1	1	1	3
Causes contracting problems		1	2	1	4
Is not customer fault		3	4	1	8
Causes poor estimates		2	4	0	6
Provides extra work		2	3	1	6

FIGURE 33. YEAR END PROJECT FUNDING

Five of the eight Code 30s indicated that backlog goals had been established. The goals specified varied considerably, too much so to present here. These goals were used to determine what action management had to take and monitor workload. For example, as the backlog increased, the Codes 420 and 430 used temporary personnel and overtime to reduce the workload and improve response.

Backlog must be small enough to be responsive, yet large enough to fully employ the PWC resources throughout the year. When asked what the lowest shop day backlog amount was to keep the Maintenance Department workforce fully employed, the PWC managers provided many different answers. The lowest figure noted was eighty shop days while the largest figure was 315. This wide range was greatly influenced by the time required to procure materials. The largest amounts were quoted by the Pacific PWCs due to the length of their logistic chains.

8. Contracting

The PWC specific work contracting policies were fairly standard. All eight PWCs claimed that specific work contracting decisions were based upon in-house capability, job size, economical completion, shop backlog, or response requirements. Codes 30 and 400 comments about the contracting policies were as follows: contract all jobs over \$200,000; contract to maintain backlog to keep the shops busy; maximize contracting; and maximize in-house accomplishment consistent with response. The most striking disparities of these comments were explained by differing site conditions. For example, one PWC noted that the availability of capable contractors was lacking except for very small jobs.

The PWCs varied in terms of how the contracting decisions were made. The respondents noted that contracting decisions were made by: Code 350 (2); codes 350 and 400 (2); Codes 30, 350, 400 and 500; Code 350 with Code 400 and/or Code 420 assistance (2); and the customer and the Activity Civil Engineer. The number in the parentheses indicates the number of responses.

The contracting decisions were accepted relative to the type of work and the reasons. Fifty-two of the 63 respondents indicated that PWCs contract the correct types of work. PWC managers agreed with the type of work decisions by 35 to four whereas the SCEs agreed by 17 to seven. The dissenters

indicated that the PWCs contract all types of work and in doing so PWCs lose in-house capability; that easy work was contracted; or that the PWCs did not contract enough. Seventy-seven percent of the same respondents thought that the PWCs contract for the correct reasons. Seventy-nine percent of the PWC managers agreed with the reasons, whereas 72 percent of the SCEs agreed. The dissenters said that contracting was accomplished only to meet ceiling restrictions, economics were not sufficiently addressed, and that the decisions were sometimes not objective.

Six of the eight PWCs indicated increased contracting when the backlog reached a certain amount. For those respondents who answered the question, the backlog amount was 100, 150, and 225 shopdays, respectively.

Figure 34 shows the responses when the managers were asked which method of accomplishment was faster.

Code	Top Priority (A)		High Priority (1-2)		Routine (3-4)	
	<u>Contract</u>	<u>PWC</u>	<u>Contract</u>	<u>PWC</u>	<u>Contract</u>	<u>PWC</u>
30	0	8	0	7	6	2
110	0	8	2	6	8	0
350	0	6	1	5	3	3
351	0	7	0	7	5	2
400	1	7	1	7	5	2
420	0	5	0	5	3	2
430	0	7	0	7	4	3
500	0	6	0	6	1	5
510	<u>0</u>	<u>5</u>	<u>0</u>	<u>4</u>	<u>1</u>	<u>3</u>
	1	58	4	54	36	22
SCEs	<u>3</u>	<u>20</u>	<u>10</u>	<u>13</u>	<u>16</u>	<u>7</u>
	4	78	14	67	52	29

FIGURE 34. IS CONTRACT OR IN-HOUSE ACCOMPLISHMENT FASTER?

The responses indicated the PWC managers and the SCEs agreed that in-house accomplishment was faster for the top and high priority work whereas contract accomplishment was faster for routine work. The Codes 500 and 510 were the only respondents who maintained that PWC was faster in all cases.

Contracting did create problems for PWCs in the writing of the specifications. Twelve of the 19 PWC managers questioned said the contract specification writing was a problem. As one SCE put it, "contract engineering and specification writing makes contracting expensive and untimely."

Concerning customer preference for contract or in-house accomplishment, 33 percent of the PWC managers said the customer preferred in-house accomplishment, whereas 20 percent said contract. The remaining managers said that it depended upon the circumstances. The SCEs responses were somewhat similar with 28 percent preferring in-house accomplishment, 16 percent preferring contract, and 56 percent saying that it depended upon the circumstances.

Figure 35 presents the responses to the question concerning whether more or less specific work should be contracted.

	<u>More</u>	<u>Less</u>	<u>Okay now</u>
PWC Managers	10 (16%)	22 (36%)	29 (48%)
SCEs	10 (42%)	3 (13%)	11 (45%)

FIGURE 35. SHOULD MORE OR LESS WORK BE CONTRACTED?

For the respondents who advocated a change in the amount of contracting, the SCEs desired more and the PWC managers desired less. The PWC managers wanted more due to ceiling reductions, better job control, and reduction of backlog. They wanted less for reasons of quality, flexibility, the benefit to the Navy, response, control, personnel availability, and because they surmise PWC outperforms the contractor. The SCEs desired more routine work contracted to reduce backlog. Then who wanted more due to cost, coordination, response, and quality. They desired less for more control, quality, and responsiveness. These variations of these comments were the result of individual experience at each different location.

As the amount of contracting increases changes in the PWC method of operations may be desireable. As the amount of contracting increases, Codes 30, 350, and 400 said that the PWCMS would have to be changed. The changes predicted were to streamline the workflow, reduce overhead, reduce the amount of controls, reallocate personnel, and change response targets.

9. Customer Liaison and Actions

All questions relating to customer liaison and customer actions are grouped together under this heading. Such a grouping accounts for the high ranking of this item presented at the beginning of this section.

Customer work input and the information supplied on the work request are important for PWC to understand what is

being requested and to determine how the work request should be processed. The Code 430s said that the customers provided complete job information only sometimes as opposed to frequently. The Code 110s thought that the work input was only slightly better. The SCEs, on the other hand, said that complete job information was provided frequently. Figure 36 shows the responses.

<u>PWC Code</u>	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Never</u>
110	0	0	7	0
430	0	3	5	0
SCEs	9	15	1	0

FIGURE 36. DOES THE WORK REQUEST CONTAIN COMPLETE JOB INFORMATION?

Six of the eight PWCs indicated that work requests were sometimes returned to the customers to provide additional information.

All eight PWCs used the priority system proposed by the Naval Facilities Engineering Command (NAVFACENGCOM). This particular system was considered satisfactory by 82 percent of the PWC Codes, 30, 110, and 350. Those managers who did not think it was satisfactory specified causes such as customer abuse, pre-emption of low priorities, and ineffectiveness of the low priorities.

These same managers were not decisive on the question of priority inflation. Fifty-two percent said that priority inflation was a problem while 48 percent said it was not.

Those respondents who indicated that priority inflation was a problem noted that inflation occurred mostly at the end of the fiscal year they also said that the customers inflate the priorities, inflation dilutes the priority meaning, and inflation promotes inflation. Other comments advised that the customers must follow the guidelines, PWCs must enforce the system, and PWCs must review and adjust the priorities to make the system work.

Half of the PWCs made automatic adjustments to the customer work request priorities if certain actions were not completed in expected timeframes. The criteria used were upgrading expiring funds jobs, customer completion dates, age of the work request, and the absence of funding fundable estimates. Work requests were upgraded if the job had not completed the planning process within nine and 12 months. Only two PWCs indicated that numerical limits had been established for the number of customer work requests in any one priority category.

The SCEs felt that they knew the PWC work processing system, its requirements, and how to work with it. Figure 37 shows the responses concerning knowledge of the PWC system.

How well does the customer know the PWC system?

	<u>Very well</u>	<u>Well</u>	<u>Somewhat</u>	<u>Don't know</u>
SCEs	17	8	0	0

Does the customer know PWCMS and its requirements?

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	4	4
351	6	1
420	<u>1</u>	<u>5</u>
	11	10

FIGURE 37. CUSTOMER KNOWLEDGE OF PWC SYSTEM.

The PWC managers were cummulatively indecisive about the customer knowledge of the PWC system and its requirements. Code 351s said the customer knew the system, whereas the Code 420 disagreed. The Code 110s who work very closely with the customers split their evaluation. In this regard, both the PWC managers and the SCEs said that the customers actions were completed quickly. Figure 38 shows the responses the questions about the completion of customers action

Do the customers complete their actions quickly?

<u>PWC Code</u>	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>	<u>Usually not</u>
110	0	7	1	0
351	0	4	2	1
420	0	2	4	0

Do you complete your actions quickly?

	<u>Always</u>	<u>Frequently</u>	<u>Sometimes</u>
SCEs	4	17	4

FIGURE 38. COMPLETION OF CUSTOMER ACTIONS

The SCEs felt that they completed their actions slightly faster than what the PWC managers felt. However, 75 percent of the Codes 110 and 350s indicated that customer funding of top priority jobs were completed quickly.

The PWC managers thought that the number of customer scope changes and amendments was a problem. Figure 39 presents the responses to the question about scope changes and amendments.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
351	3	4
352	3	0
420	5	1
430	<u>4</u>	<u>3</u>
	15	8

FIGURE 39. ARE CUSTOMER SCOPE CHANGES AND AMENDMENTS
A PROBLEM?

Overall, 65 percent of these PWC managers said that the scope changes and amendments were problems. The managers who worked most closely with the customers on changes voiced the strongest concern over this problem. Suggestions to reduce or eliminate this perceived problem varied. Actions such as better work input, better customer planning, better customer information, better P&Es, and more fixed price jobs were noted for reducing the number of scope changes and amendments.

10. Response targets

Figure 40 shows the PWC managers response to the question regarding PWC response targets and their applicability.

<u>PWC Code</u>	<u>Yes</u>	<u>No</u>
110	5	3
30	6	2
350	4	2
351	2	5
400	6	1
420	5	1
430	2	5
450	5	3
500	4	2
510	<u>1</u>	<u>3</u>
	40	27

FIGURE 40. ARE PWC RESPONSE TARGETS TOO OPTIMISTIC?

With the exception of Codes 351, 430, and 510, the PWC managers said that the PWC response targets were too optimistic. The reasons for this assessment included material procurement problems and long lead times, the continual presence of large backlog, personnel restrictions, the year end dump, and the pre-emption of the work schedules by priority jobs. Other comments indicated that the response targets were unrealistic, not related to available resources, allowed no flexibility, and were inconsistent with the customer needs.

When asked if the PWC was responsive when the processing system was by passed or short circuited, 14 of the 25 SCEs said yes. On the other hand, only 12 of the 62 PWC managers said that the PWC was responsive only when the processing system was by-passed.

The Code 350s were asked to indicate what the actual PWC response was and what the response targets were for the average specific job. The calendar day numbers were requested by priority. Figure 41 shows the means of the responses. The number in the parentheses is the standard deviation which indicates the degree of variation. Except for top priority material procurement and routine shop accomplishment, the Code 350s indicated that actual response exceeded the targets. The divergence of the two sets of numbers increase as the job priority decreases. The standard deviation did not present any trend, but they did indicate that actual performance varied considerably and the concept of response targets was not uniform. The variation was greatest for lower priority jobs.

The variations of material procurement and shop accomplishment were large as expected since the length of the PWC logistic chain and the size of the average specific job varied from one PWC to another.

The SCEs were requested to indicate what response they were receiving and what response they desired. The summary results are presented in Figure 42. The SCEs indicated that the actual response was greater than the desired response. Their estimations of the actual response were consistently higher than those of the Code 350s. The SCEs desired response was not consistently higher or lower than the PWC targets. There was sufficient proximity, however, to note that PWC achievement of their targets would serve to satisfy the customer expectations.

The purpose of these questions was to obtain a general assessment of the PWCs response. The data were not sufficiently reliable to perform an in-depth analysis. The survey did demonstrate that the concept of responsiveness varies with the respondents perception of it. Although a direct comparison can not be made with NAVFACENGCOM response goals, the survey did not indicate a universal acceptance of these goals.

11. Corrective Actions

Three questions were asked about corrective actions to improve PWC response: How can productivity be improved?; What actions have you taken to improve response?; and What changes can be made to improve overall PWC response?

	ACTUAL RESPONSE			RESPONSE TARGETS		
	TOP (A)	HIGH (1-2)	ROUTINE (3-4)	TOP (A)	HIGH (1-2)	ROUTINE (3-4)
FUNDABLE ESTIMATE	3.2 (6.0)	22.4 (22.3)	34.6 (22.8)	6.6 (4.7)	10.5 (4.0)	14.2 (0.5)
ENGINEERING	23.7 (16.6)	40.2 (22.0)	58.7 (24.5)	20.0 (10.9)	34.3 (9.2)	54.3 (32.0)
JOB PLAN	11.0 (7.8)	25.0 (14.6)	43.2 (16.3)	9.8 (6.2)	16.5 (3.3)	23.2 (4.5)
MATERIAL PROCUREMENT	21.0 (9.0)	52.0 (7.5)	74.0 (19.6)	28.0 (11.4)	41.2 (.75)	60.0 (21.2)
SHOP ACCOMPLISHMENT	35.0 (22.9)	53.3 (40.4)	51.2 (79.6)	33.7 (18.8)	52.0 (35.0)	91.6 (77.5)

FIGURE 41. PWC RESPONSE TARGETS.

	ACTUAL RESPONSE			RESPONSE TARGETS		
	TOP (A)	HIGH (1-2)	ROUTINE (3-4)	TOP (A)	HIGH (1-2)	ROUTINE (3-4)
FUNDABLE ESTIMATE	15.1 (12.1)	32.6 (24.3)	72.7 (51.0)	7.5 (6.4)	14.4 (9.6)	38.9 (35.6)
ENGINEERING	40.7 (31.1)	75.0 (50.0)	126.1 (103.4)	15.0 (9.8)	31.6 (20.9)	63.0 (44.4)
JOB PLAN	22.9 (19.9)	40.9 (31.3)	64.9 (53.5)	6.0 (8.2)	20.5 (15.4)	35.2 (22.3)
MATERIAL PROCUREMENT	57.8 (40.4)	106.5 (80.8)	169.0 (179.7)	21.0 (14.0)	44.4 (17.0)	66.3 (39.7)
SHOP ACCOMPLISHMENT	39.7 (38.5)	59.5 (44.8)	108.7 (88.6)	27.1 (25.2)	40.4 (34.0)	77.6 (69.1)

FIGURE 42. CUSTOMER RESPONSE TARGETS.

Comments concerning improving PWC productivity were many and varied. Only a few of these comments suggested employing new equipment or work methods. The Code 420s wanted more computer assistance for designs. Code 30, 500, and 510 desired improved equipment, tools, and work methods. Most of the comments involved improving management actions and existing procedures. Actions such as better support, more coordination, reduction of job and schedule changes, less interruptions such as paperwork, better transportation support, and improvements of employee morale were representative of the comments.

Actions taken to improve response indicated that the perceived problem areas were being attacked. Issues such as staffing, contracting, quality control, supervision, planning, customer liaison and communications were being addressed. Also, actions were being taken to enforce the use of and compliance with the priority system, and improve scheduling, job plans, and engineering performance standards. Specific improvement actions included obtaining better equipment, utilizing PWCMS reports, eliminating nonproductive interruptions, realigning the workforce, and more contracting. Finally, workload management and analysis were being accomplished to improve management decision making.

Suggestions to improve overall PWC response were similar to the prior questions comments. Personnel staffing, hiring flexibility, material procurement flexibility, customer liaison, and coordination characterized these comments. The specific comments to these questions have not been presented

due to the quantity and their repetitive nature. The reader is referred to Appendix B for the summaries of these responses.

E. SUMMARY

This chapter has discussed the author developed survey conducted to assess PWC specific work processing problems. It explained the origin of the thesis idea and described the development of the questionnaires. The survey results were presented grouped under subheadings relating to certain aspects of specific work processing.

The survey determined that processing problems existed with all aspects of specific work service. Some of these aspects were perceived to be more problems than others. The perceptions of these problems were affected by the numerous variables which influence specific work.

The survey did not contain any simple solutions. The suggestions offered by the respondents to solve these problems varied considerably. The survey did contain some issues which must be taken into account when PWCs address processing problems. These issues are the need for adequate customer liaison, proper work input, responsive material procurement, effective scheduling, productive use of manpower, realistic response targets, and the need for workload management. These issues will be discussed in the next chapter.

IV. DISCUSSIONS AND CONCLUSIONS

A. INTRODUCTION

The specific work survey addressed in Chapter III was conducted to identify work processing problems at Navy Public Works Centers (PWC). It also solicited the corrective actions which the managers thought could improve response. These problems and corrective actions which were presented in Chapter III are discussed in this chapter relative to basic management concepts and the overall system described in Chapter II. This concluding chapter does not attempt to identify specific actions which would solve work processing problems, but it does present some issues which should be considered when PWCs address these problems.

B. OVERVIEW OF SPECIFIC WORK PROCESSING PROBLEMS

The results of the survey identified several problems with specific work processing at PWCs. A problem was identified with every processing step; work input, estimating, engineering, job plan, material procurement, and shop accomplishment. In addition, support activities such as scheduling, customer liaison, customer actions, supervision, and reports were classified as containing problem issues. Also, regulations and constraints imposed by others were considered too rigid and did not allow flexibility for the PWC managers to make

decisions and take actions which enhanced the interests of the PWCs in meeting response targets and customers' expectations.

The specific work processing problems identified by the survey were extensive. Perhaps such pervasiveness could be anticipated since there are many facets and factors which affect specific work and its processing. On the macro scale, PWCs are large entities which are confronted with a complex interface of all the elements of individual and organizational behavior. These elements include leadership, motivation, productivity, group dynamics, power, conflict, and communication. The problems relating to these issues are numerous, complex, and can be very difficult to identify and control.

On the micro scale, the operating environment of each PWC differs; therefore, the response and processing problems also differ. There are several reasons for these variations such as different types and mixes of customers and their unique work requirements, personnel management styles, local site conditions, geographical locations, length of logistic chains, support availability such as contracting, and social influences. For example, the operating environment for PWC, Guam is much different than PWC, Norfolk's. Operating environments affect the managers' perceptions regarding processing problems, their importance, and the corresponding corrective actions.

The managers' perceptions were also affected by their organizational positions. The PWC managers responsible for one function frequently held different perceptions or opinions than the other PWC managers with the same experience backgrounds, but occupying different positions. The managers closest to the actual work accomplishment were more inclined to defend their functional performance than to criticize it. The problems which the managers identified were related to external functions or factors beyond their control. This normal organizational attitude or loyalty is healthy as long as it does not generate the "we and they" atmosphere which detracts from purposeful daily operations and long term goal achievement.

The survey contained a large number of diversified corrective actions suggested by the PWC managers. The more complicated the problems, the more numerous and diverse were the suggested corrective actions. Obviously, they are related to each other. The corrective actions did not suggest any particular courses of actions or methods of operations to resolve specific work processing problems; however, they did confirm the complexity of this subject.

The implementation of suggested corrective actions must take into account the fact that the PWC resources are relatively fixed, and are common to more than one type of service offered by the PWCs. Actions to improve specific work processing can and will affect the other services, and vice versa.

For example, increasing the journeymen availability to work specific jobs may mean that other services must be decreased, or, that the devotion of a larger percentage of these fixed resources to specific work can mean reducing the PWC's ability to provide the other services at current levels. One action can cause a similar, but negative reaction somewhere else. This dependency relationship must be recognized and considered in any proposed corrective action.

Although the thesis research did not produce any simple answers to the work processing problems identified, it did provide some insight into several concepts which PWC managers should consider. These concepts will be discussed in the following sections.

1. Work Input and Customer Liaison

Knowledge and understanding of the system from which a customer desires some sort of service is essential in obtaining that service. This point is especially true for PWC specific work due to the extent of customer involvement required for successful completion of the job. Knowledge and understanding of PWC operations and requirements allow the customers to effectively interact with the PWC. Close coordination and communications are mandatory if satisfactory specific work service is to be provided. The survey indicated that the Staff Civil Engineers (SCE) knew the PWC operations and requirements very well. However, the SCE comments

on the questionnaires concerning specific work raises the question that they may not possess an adequate knowledge and understanding.

An indication of the customers' appreciation of PWC operations can be demonstrated by the amount of information placed on the work request when it is initially submitted to the PWC. The survey indicated that work request information did not meet the PWC managers' expectations in most cases. The PWC managers expected the identification of the problem or deficiency to be corrected, along with all known relevant information and a suggested solution, if known. This simple requirement was not always met. The thesis research indicated that the work requests infrequently provided all the necessary information for the PWC personnel to interpret what was being requested. Unnecessary and extra effort was required to obtain such missing information before the estimating or planning phase could commence. Also, missing critical job data such as tolerances and design criteria resulted in faulty designs, unsatisfactorily completed projects, and additional costs in order to meet the customers requirements.

The PWCs must take action to ensure that work requests are submitted correctly, or, that they are properly corrected with additional or new data. Initial work request screening must be conducted by an appropriate office upon original receipt of the work request. Those work requests not meeting submission requirements should be returned to the customer for revision.

When job urgency does not allow such action, a coordination meeting should be held to review full job requirements with all concerned individuals.

In submitting work requests to the PWC, the survey found that the customers did not always assign the priority which matches the job urgency in accordance with published standards. Customers had a tendency to assign higher priorities than warranted for the purpose of obtaining faster response. This priority inflation dilutes the meaning of the higher priorities and causes the lower priority work to be continually pre-empted.

Proper priority assignment relative to the job urgency must be enforced. This means that the PWCs must review the work request priorities and take action to downgrade where necessary. Review guidelines must be established such as limitations on the percentage of customer work requests for each priority. Also, time limits should be set for certain processing actions; for example, a requirement should be established that customer actions such as funding and PWC actions such as estimating and planning be completed within certain timeframes. If these timeframes are not met, the job priority should be automatically down or upgraded as appropriate.

Correct and timely identification of work can make the difference between routine or breakdown maintenance; between maintenance and repair or replacement. Work identification is important to achieve efficient facility maintenance.

The survey indicated that the PWCs were somewhat involved in customer work identification. It also indicated that the customers desired more assistance in work identification. Increased PWC effort in this area will have beneficial results in terms of better facility maintenance and repair, and better PWC knowledge of customer facility requirements. It will also assist the customer with facility budgeting and planning, and improve work input to the PWCs.

The PWC tends to be reactionary to the customer. Except during an emergency, PWC specific work action does not commence until the customer submits a work request. Although the PWC can not perform work unilaterally for the customer, the PWC can and should become more involved in the work identification and associated preliminary planning for the customers. PWCs should take the lead in assisting the customers in identifying required maintenance and repair actions to meet the needs of the Navy.

2. Scheduling

The variables associated with the scheduling process are few. They are a sequence of steps, job priority, manhour estimates, and manpower availability estimates. This information is not generated by the scheduler, but by others. In some cases, the performing organizational element which is scheduled provides the information. For example, Code 500 provides the scheduler with the manpower availability projection for shop accomplishment. Also, Code 430 provides the

manhour estimates for job plan writing. This information is the basis for scheduling and determines the schedule accuracy.

The scheduling process is conceptually simple. Based upon the job priority, the scheduler matches the manhour estimates to the manpower estimates and establishes the schedule. Although simple in concept, the survey found that scheduling was considered a problem and was not accomplished smoothly.

The data presented in Chapter III pinpointed some of the problems with scheduling such as accuracy of the scheduling information, unanticipated interruptions, and unforeseen or changing job requirements. Manhour estimates did not always account for the full job requirements or the degree of effort necessary to satisfy those requirements. The lack of satisfactory planning caused job interruptions and delays by not adequately identifying the work to be accomplished. Overscheduling eroded the benefits of the scheduling process. Priority inflation and unanticipated high priority jobs disrupted the established schedule.

Problems such as these produced changes in the established schedule and created extra burdens for the personnel involved. These changes resulted in wasted effort, inefficiencies, and cost overruns. These effects are unsatisfactory to the customer and the PWC. Both parties are impacted unfavorably by schedule changes, yet both are responsible for their creation.

Corrective action to reduce or eliminate schedule changes must involve both the PWC and the customer. Although the responsibilities are not equally shared, both parties must work together in resolving their causes. This task is not an easy one, but it must be addressed by the PWCs with more emphasis.

3. Manpower resources

Manpower resources are devoted to either productive or nonproductive effort. The former involves accomplishing specific work processing, while the latter involves duties not directly related to specific work processing. One is the complement of the other. This simple fact is sometimes overlooked in this era of management enhancement. Increased emphasis is being placed on management and evaluating performance. This emphasis detracts from productive efforts devoted to accomplishing the task at hand. The survey contained many comments about the degree of nonproductive duties affecting a managers' ability to accomplish the assigned function.

These nonproductive duties adversely affected the amount of time available for productive effort. Whether known beforehand or not, these disruptions were not always recognized in the production process. Manpower availability projections were affected. Employee productivity and motivation were also affected. In this regard, one PWC Commanding Officer (CO) stated that the production process did not

adequately account for the human element. Another CO said that the PWCs are overmanaged and under supervised.

Nonproductive activities such as collateral duties, administrative functions, paperwork, special investigations and some meetings serve a valuable and needed purpose in any organization; however, the effect on productive time must be recognized. This effect can be reduced with prudent assignment or utilization of such tasks. For example, administrative procedures currently in force may have been established to serve a particular purpose which has since been overcome by events. New management practices do not always change the associated administrative actions serving the former practices. The issue here is not to arbitrarily eliminate nonproductive activities, but to review and revise the administrative functions for the purpose of requiring only what is necessary.

Productive time should also be reviewed to determine if the amount of effort to be expended is in fact correct for the desired end objective. In this regard, the survey raised questions about overengineering and overplanning. Although the responses varied, they indicated that improvements might be in order. In engineering, for example, a sketch may suffice instead of a fully detailed drawing. Also, draftsmen can be used to layout the necessary design drawings instead of scarce engineers.

The amount of service provided to the customer must match the customer's requirement and the prudent concern for resources. In this regard, the usefulness of the scoping estimate should be tailored to customers needs. For some customers a written and detailed scoping estimate served a worth while purpose, but for others estimate provided over the telephone was adequate. The effort expended on scoping estimates should be adjusted accordingly. The reduction or elimination of the scoping estimate manhours of effort could be diverted to more important services.

The author does not suggest the sacrifice of quality for work simplification or response, however, he does suggest that improvements in productivity require the review and evaluation of time use and the comparison of the end product against the original requirements.

4. Response targets

Response is a relative issue. What is responsive to one PWC or customer may be unresponsive to another. The survey demonstrated this point. The PWCs goals contained variations as did the SCEs desired response target. Individual expectations and historical experience formed the basis for such variations. Deviations were also caused by the nature of specific work. The average size of job varies among customers and is usually proportional to their size of operations. Therefore, both the customer and the PWC will have different

concepts of response.

Response targets are required to provide the customer with an indication of expected completion times and to provide the PWC with a means to evaluate performance. The response targets established by the Naval Facilities Engineering Command (NAVFACENGCOM) were considered by the PWC managers to be overoptimistic. What the specific work response targets should be is not the subject of this thesis; however, as the survey comments said, response targets must be realistic.

When addressing response targets several points must be considered. First, the customer has the responsibility for certain actions throughout the processing cycle. These actions can and do affect the overall job completion time. One Code 350 study indicated that customer actions from work input to completion accounted for about half of the total response time. The customers must recognize this responsibility and act accordingly.

Second, there are tradeoffs associated with response. The thesis research found that rushed planning and engineering, or starting a job without all the material on-hand will seemingly increase response, but these actions can also create problems in succeeding processing phases and actually prolong the completion time. With sufficient devotion of manpower resources the succeeding problems can be minimized. However, in those cases, other jobs suffer delays resulting from the diverted manpower.

Third, specific work does not easily accommodate the establishment of response targets. The work input varies throughout the fiscal year. Completion times vary with the job size, complexity, and priority. These factors make average completion times meaningless. Also, response targets related to the percentage of jobs completed may not facilitate record keeping nor management use.

These factors in addition to the PWC capability must be incorporated into the establishment of response targets. Such targets must be representative of the PWCs productivity and of value to both the PWC and the customer. The establishment of response targets which meet these prerequisites is not a simple task. Further study into this subject is recommended.

5. Material procurement

Material procurement is of major importance in the processing of specific work. The ability of PWC to properly execute the engineering and planning evolutions relies on material procurement. It also affects the quality of the end product in terms of the type of material used.

The survey indicated that material procurement is considered the biggest single problem confronting specific work processing, and greatly affects overall response. It determines the shop scheduling dates. The delivery lead times upon which the start dates were based, were not always accurate. This caused complete revisions to the shop schedule.

Many shop accomplishment problems resulted from the receipt of improper material, lack of material, or additional material requirements.

The information which the Code 450s use to procure the required material is provided by other divisions. The engineering design establishes the basic material requirements and specifications. The job plan with its listing of quantity and type of material line items forms the instruction for the succeeding procurement. The completeness of the engineering and job plan actions determines the degree of accuracy and consequent absence or presence of material procurement problems.

While taking actions to obtain the specified material, the Code 450s interface with organizations external to the PWC. In some cases, other supply agencies pursue the actions necessary to obtain the material. In other cases, the PWC interfaces directly with vendors to obtain the material. Regardless of the procurement method, the Code 450s rely on external sources for information concerning delivery times or material availability.

With the operating situation the effectiveness of the material procurement actions is based on uncontrollable variables. When addressing material procurement issues the ability to influence these variables must be taken into account. The Code 450s do not have direct control over material availability or delivery times. The Code 450s can

influence these actions, but the success will vary with each action.

Although the Code 450s have limited control over the procurement actions, they can concentrate on coordinating material requirements versus material status with the other PWC managers. Such coordination is a two-way process with each party working together to achieve the common end objective. This simple proposal, however, is not easy to accomplish. The number of job and material line items plus the difficulty of coordinating daily operation make this task difficult.

The actions suggested by the survey respondents to improve material response did not provide simple solutions. Some of the suggestions, such as changing the procurement regulations are not readily forthcoming. Some of the suggestions are within the control of the PWCs, such as scheduling jobs with the best available information, starting jobs with all the materials onhand, enforcing the use of established procedures, evaluating staffing requirements, and changing inventories to meet operating requirements. Such actions may or may not be feasible, but should be investigated and implemented, if warranted.

There are no easy answers to the material procurement problem. The extent and impact of this problem can not be ignored. PWCs must evaluate their individual systems

relative to their operating environments and use of procurement flexibility to maximize availability. Also, the employment of inventory control management models should be investigated. This area is a condidate for further study.

6. Workload Management.

The PWCs operate in a changing environment. The thesis research found that personnel resources are being reduced while the workload is growing. Under these conflicting trends, it is imperative that PWCs manage specific work in the aggregate. Workload analysis must be conducted to aid in proper and timely management decisions.

The shop day backlog measure provides the basis to accomplish aggregate planning. Given its resources, a PWC can determine its specific work capability. Utilizing staffing levels and productivity factors, such as the number of planner and estimators (P&E) manhours per job plan hour, production capability for each processing phase can be determined. Statistical techniques can incorporate the variable uncertainties. The summation of these capabilities with material procurement lead times forms the basis for establishing backlog targets.

In setting backlog targets other factors must be considered. A statistical workload forecast must predict specific work input for the full fiscal year. Journeymen and P&E trade mixes, as well as the ability to contract, must also be considered. With these factors and the response targets, backlog goals can be established for certain periods throughout the year.

With a system to monitor the backlog against these targets, contracting decisions can be made to balance workload against response. Backlog or response is only one factor to consider when making contracting decisions. Other factors are job size, PWC skill capability, and job cost. The survey indicated that job priority should be added to the list. Although the customers preferred PWC accomplishment in most cases the low priority work was recommended for contract accomplishment. Each one of these factors should be periodically reviewed and the contracting guidelines updated as warranted. These guidelines can be used by the appropriate level of the organization in making contracting decisions.

Aggregate planning and workload analysis can provide PWCs the mechanism to aid in making work processing decision and to monitor total performance. The method of workload management requires further study to determine the best application of established management techniques.

C. CONCLUSIONS

The problems associated with specific work service are numerous and complex. The issues underlying these problems involve all aspects of specific work and PWC operations. The variables affecting these issues are interrelated. They are not independent, and affect more than one type of service. Corrective actions involving one variable may negatively affect

another variable or service. These variables, however, must be isolated for effective analysis and the relationships with other function must be identified. When investigating specific work problems, PWC managers must develop a methodology to deal with the numerous issues, variables and relationships.

Specific work processing problems must be investigated and dealt with since they affect the expenses of real property maintenance activities. Effective and timely maintenance and repair actions will extend the useful life of facilities. In addition, specific work problems affect the PWC cost of doing business, and in turn, the costs to the customer activities. Resulting increased costs limit the customers' abilities to fund needed maintenance and repair work. The higher costs also erode PWCs effectiveness in serving its customers.

This chapter has discussed the problems identified by the survey in broad and general terms. Although specific answers to specific work processing problems were not generated, certain conclusions can be made. These conclusions are summarized below.

1. Customer liaison. Customer liaison plays a very important role in providing timely specific work. Customer knowledge of PWC operations and the PWC's understanding of customer requirements form the basis for the cooperation needed for the smooth flow of work from input to completion. An adequate level of understanding and cooperation must be achieved and maintained between PWC and its customers.

2. Work input. Timely, accurate, and complete work input is essential to provide the information necessary for effective PWC work processing. Joint PWC and customer actions must ensure that work input meets efficient operating requirements.

3. Priority system. Improper use of priorities detracts from effective work processing decisions. The priority system must be enforced in some manner so the best decisions with regard to processing the most important work first are made.

4. Scheduling. The scheduling process relies on a limited amount of information. This information should be investigated to increase its accuracy and eliminate the causes of inefficient scheduling changes.

5. Material procurement. Material procurement is just one of many problems of specific work. The degree of control over material procurement must be identified while maximizing the use of procurement flexibilities. All PWC managers, not only those directly involved, must work together to improve material response time.

6. Manpower resource. As a declining resource, manpower should be concentrated on productive efforts. New nonproductive duties should be assigned only when absolutely necessary. Existing nonproductive duties should be reviewed for their necessity.

7. Workload management. Workload management, as it entails forecasting of work, backlog and capability, must be undertaken in the aggregate to provide a means to make proper and timely decisions.

D. RECOMMENDATIONS

The problems confronting PWCs and specific work processing can not be resolved without further investigation and analysis. Many of these problems can not be addressed in any one study of all PWCs since the operating environments vary from one location to another. Certain issues, however, can be studied for general application. The following three items are recommended for further study.

1. Material procurement. As one of the biggest specific work processing problems improvements in material procurement responsiveness is required. A study should be undertaken into material procurement problems and the applicability of material management models.

2. Response targets. The establishment of response and backlog targets are the means to evaluate performance and make work processing decisions. A methodology to determine useful and realistic targets must be identified in order to assist this decision making.

3. Workload management. Workload management is mandatory to aid decision making. A simple, but effective method for PWCs to forecast workload and make processing decisions such as scheduling or contracting needs to be determined.

E. SUMMARY

The purpose of this thesis was to identify specific work processing problems by means of a survey. The survey was also used to identify corrective actions which the managers were taking.

The thesis did not endeavor to determine and recommend a particular course of action to solve response problems. Such action is beyond the scope and intent of this thesis. The author feels that no one thesis could adequately undertake to resolve specific work processing of and the number of factors involved. The thesis does present many factors which must be considered when PWC managers address specific work problems.

Each PWC must assess its business posture, identify its strengths and weaknesses relative to providing satisfactory specific work service, and take appropriate actions to resolve problems, correct deficiencies, and develop its strengths. This procedure should be accomplished in a manner consistent with the PWC's long range plans and direction. The assessment and follow-up actions will no doubt result in workforce realignments, changes to policies and procedures, and adjustments in the methods of conducting business. Such actions are necessary for the PWCs to maintain their value as an efficient provider of specific work to customers and to the Navy.

APPENDIX A

LIST OF STAFF CIVIL ENGINEERS SURVEYED

Naval Station, Norfolk, VA.
Atlantic Fleet Headquarters Support Activity, Norfolk, VA.
Naval Air Station, Norfolk, VA.
Naval Air Rework Facility, Norfolk, VA.
Naval Communication Station, Norfolk, VA.
Naval Supply Center, Norfolk, VA.
Naval Air Station, Pensacola, FL.
Naval Education and Training Program Development Center,
Pensacola, FL.
Naval Aerospace and Regional Medical Center, Pensacola, FL.
Naval Technical Training Center, Pensacola, FL.
Naval Training Center, Great Lakes, IL.
Naval Regional Medical Center, Great Lakes, IL.
Naval Administrative Command, San Diego, CA.
Naval Training Center, San Diego, CA.
Naval Air Station, North Island, San Diego, CA.
Naval Station, San Diego, CA.
Shore Intermediate Maintenance Activity, San Diego, CA.
Naval Regional Medical Center, San Diego, CA.
Naval Supply Center, San Diego, CA.
Marine Corps Recruit Depot, San Diego, CA.
Naval Amphibious Base, Coronado, CA.
Naval Oceans Systems Center, San Diego, CA.
Naval Shipyard, Pearl Harbor, HI.
Naval Station, Pearl Harbor, HI.
Naval Supply Center, Pearl Harbor, HI.
Naval Submarine Base, Pearl Harbor, HI.
Naval Air Station, Barbers Point, HI.
Naval Communication Station, Pearl Harbor, HI.
Naval Communication Area Master Station, Guam
Naval Station, Guam.

Naval Regional Medical Center, Guam.
Naval Supply Depot, Guam.
Naval Air Station, Guam.
Naval Ship Repair Facility, Guam.
Naval Supply Depot, Yokosuka, JA.
Naval Regional Medical Center, Yokosuka, JA.
Naval Ship Repair Facility, Yokosuka, JA.
Naval Ship Repair Facility, Subic Bay, RP.
Naval Air Station, Cubi Point, RP.
Naval Supply Depot, Subic Bay, RP.
Naval Magazine, Subic Bay, RP.

APPENDIX B

SURVEY QUESTIONNAIRES AND SUMMARIZED RESPONSES

This Appendix contains the twelve questionnaires used in this thesis. Each questionnaire is identified by the recipients position and they are arranged in order of the organizational code with the Staff Civil Engineer questionnaire last.

The responses have been summarized and noted with each question. For multiple choice questions, the number of responses are indicated. For open ended questions, the responses are paraphrased. The numbers in the parentheses indicate the quantity of responses.

Administrative Sciences Curriculum
Naval Postgraduate School
Monterey, California

20 August 1980

Dear Production Officer,

As a student at the Naval Postgraduate School, I have selected PWC specific work as a thesis topic. The thesis will look at problems, goals, perceptions, and management actions relative to specific work. The emphasis is less on the management system and more on how that system is used.

With the approval of NAVFACENGCOM, Code 15A, I am sending the attached questionnaire to each PWC production group. This questionnaire is composed of eleven parts, one for each of the following codes, per the standard organization; 30, 110, 350, 351, 352, 400, 420, 430, 450, 500, and 510. You are requested to distribute these questionnaires to each code, or your equivalent, for completion and direct return with the pre-addressed envelopes. Your help in getting the questionnaires expeditiously returned within 10 days is also requested.

If you or your people want a summary of the result, please indicate on the questionnaire. Your assistance in this study is greatly appreciated. Thank you.

Sincerely,

J. G. PALMBORG
LCDR, CEC, USN

Production Officer (Code 30) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg, LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best response which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. Please rank by priority (1 is highest and 4 is lowest), the relative importance/precedence of each type of work.

emergency-service	_____	} 1 - 0 2 - 1 3 - 5 4 - 2
minor	_____	
recurring	_____	
specific	_____	

2. Is the specific work priority system satisfactory to make work processing decisions and be responsive to the customer?

yes - 8
no - 0

If "no", please explain: but, PWC must adjust up and down (2);

PWCS must enforce; customer must comply

3. Do you personally consider priority inflation to be a problem?

yes - 4
no - 4

If "yes", why? Especially at fiscal year end; customers tend to
inflate priorities; flag officers want everything "now".

4. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 1
no - 7

5. Please indicate to what degree you use the following items.

	often	sometimes	almost never
commander's orders	<u>0</u>	<u>1</u>	<u>7</u>
unfunded job plans	<u>0</u>	<u>4</u>	<u>4</u>
advance material procurement	<u>2</u>	<u>4</u>	<u>2</u>
customer material priority	<u>1</u>	<u>3</u>	<u>4</u>
definitive designs	<u>0</u>	<u>3</u>	<u>5</u>
prefunded engineering account	<u>2</u>	<u>1</u>	<u>4</u>
performance contracts	<u>1</u>	<u>3</u>	<u>4</u>
project management for jobs	<u>3</u>	<u>3</u>	<u>2</u>
shop secondary skills	<u>1</u>	<u>6</u>	<u>1</u>

6. Do you have shop day backlog goals other than the 150 at the end of the third quarter?

yes - 5

no - 2

If "yes", what are they? 130 at end of third quarter; 200 - 245
range; 110 - 120 range.

7. What is the lowest shop day backlog figure which you personally feel PWC can have without the shops running out of work or having an uneven trade balance?

90; 100; 135; 200

8. Since "shop days" is determined by the variable figure of the number of persons working specifics, is "shop days" a good backlog measure?

yes - 5

no - 2

If no, what would a better measure be? Work center hours

9. What is your specific work contracting policy? Respondents

named one or more of the following: capability, backlog, job size,
response, cost. Also, maximize number of contracts; maximize in-house
work.

10. Who makes the contracting decisions? Please specify code and limits as applicable. 350 (3); 350 and 400 (2); 30; customer and ACE

11. When the specific work backlog reaches a certain amount, is contracting increased to maintain response?

yes - 6

no - 2

If yes, what is that amount? 100; 150 (2); 225

If no, how do you make contracting decisions based upon backlog?
varies; use temporary personnel;

12. Does PWC contract the correct type of jobs?

yes - 7

no - 0

13. Does PWC contract for the correct reasons?

yes - 6

no - 1

14. As the amount of contracting increases, will PMS have to be changed to become more flexible or to reduce overhead?

yes - 4

no - 1

If yes, what type of changes do you personally think will have to be made? streamline PMS and reduce overhead; has

flexibility now; when production base reduces; PMS is too detailed;

15. What are the bottlenecks in the specific work processing flow of work? Circle as applicable.

fundable estimate - 3

funding - 3

engineering - 5

job plan - 3

material procurement - 7

shop work - 0

contract specifications - 2

scope changes/amendments - 2

no bottlenecks - 0

others, please specify: (0)

16. Do you personally feel the you spend a lot of time "spinning your wheels"; that is doing things which the system should easily accommodate?

yes - 1

no - 7

If yes, what are these things: jobs fall through cracks; time

between estimation and material procurement.

17. Do you attend meetings which waste your time?

yes - 3

no - 5

18. Do the various meetings concerning specific work coordinate decisions and information?

always - 2

sometimes - 5

hardly ever - 0

19. Should more or less specific work be contracted?

more - 3

less - 2

okay now - 2

If more or less, why? contracting is okay now; more-due to ceiling reductions (2) and better job control.

20. In general, is it faster to accomplish specific work by contract or in-house forces?

	top priority(A)	high priority(1-2)	routine(3-4)
contract	<u>0</u>	<u>0</u>	<u>6</u>
in-house	<u>8</u>	<u>7</u>	<u>2</u>

21. Which do customers prefer?

contract accomplish - 1

in-house accomplish - 2

22. Are PWCs too optimistic in the response goals which have been set?

yes - 6

no - 2

If yes, why? material procurement hinders (3); too many guidelines; idealistic conditions; ceiling constraints (2).

23. Many people say that material is the biggest problem with specific work response. Do you agree?

agree - 6

disagree - 2

Why? Agree low purchase authority; suppliers not responsive (2); low NAVSUP priorities (3); lead time too long (2); material is constant problem. Disagree - material division is great.

24. What can be done to improve material response times? employ EOQ models; avoid NSCs (2); better NSC support; increase use of supply contracts; eliminate purchase restrictions (2); better monitoring and follow-up.

25. Please indicate to what degree of your personal time is consumed with customers and,

	none	some	alot	substantial
questions on job status	<u>3</u>	<u>5</u>	<u>0</u>	<u>0</u>
cost overruns	<u>5</u>	<u>3</u>	<u>0</u>	<u>0</u>
scope variances/amendments	<u>5</u>	<u>3</u>	<u>0</u>	<u>0</u>
job scope	<u>6</u>	<u>2</u>	<u>0</u>	<u>0</u>
quality complaints	<u>1</u>	<u>4</u>	<u>3</u>	<u>0</u>
response complaints	<u>0</u>	<u>4</u>	<u>3</u>	<u>1</u>
requests to push jobs	<u>1</u>	<u>4</u>	<u>3</u>	<u>0</u>
priority increases	<u>0</u>	<u>6</u>	<u>2</u>	<u>0</u>

26. Do you forecast workload for staffing and contracting decisions?

yes - 6

no - 2

If no, how do you determine future requirements? Code 350

makes an assessment; use customer funding rate.

27. What changes can be made to improve PWC overall response?

obtain more engineers (2); better customer actions (4); use PMS more;

proper staffing levels (3); improve material procurement; more open ended

contracts; reduce response targets; better job supervision.

28. How can PWC productivity be improved? Hire proper people (2);

better supervision; more Code 350 control (2); more flexibility to

shops; training; improve equipment and tools.

29. What types of actions have you taken to improve response?

contract non-production engineering; initiate P&E quality control;

obtain more project managers; monitor material procurement (2); adjust job

priorities (2); involve top management; realign workforce; training;

better workload management.

30. What do you think the top five problems are with specific work processing?

a. material procurement (5); poor customer actions (2); low staffing levels (2);

b. old work methods (2); P&E and shop communication (2); too many constraints;

c. scheduling; overtime; movement to/from work site; variances; engineering;

d. job control; field leadership; employee attitudes; accuracy of estimates

e. and job plans; "no problems".

31. Are personnel shortages really a problem or are we just not being innovative enough in our management?

a problem - 4

not innovative enough - 1

some of both - 3

32. When backlog/response is considered, is the contracting decision based upon present or future data?

present - 5

future - 3

33. Additional comments. If you care to make additional comments, please do so below and on a separate sheet. N/A

Senior Staff Civil Engineer (Code 110) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. PALMBORG, LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best response which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, but to the point statements. If you need additional space, please use a separate sheet of paper.

1. Do the Activity Civil Engineers (ACEs) spend more time within PWC or more time in the "field" with the customers?

more time with PWC - 4
more time with the customers - 2
both - 2

2. Should the ACEs spend more time with the customers or PWC?

more time with PWC - 2
more time with the customers - 4
both - 2

3. Do the ACEs spend time troubleshooting and working the jobs through the system?

almost always - 3
frequently - 4
sometimes - 1
almost never - 0

4. Do other PWC personnel rely upon the ACEs to solve work processing problems?

yes - 6
no - 2

5. Should the PWC provide more customer assistance in: (circle as appropriate)

identifying work - 0
developing job scope - 0
developing maintenance schedules - 0

6. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 0
no - 8

7. Does your priority system match the one recommended by NAVFAC?

yes - 8

no - 0

If no, please explain the differences: (none)

8. Is the priority system satisfactory for making work processing decisions and being responsive to the customer?

yes - 5

no - 3

If no, why? tailored to meet completion date; priority not related to completion time; lower priorities are ineffective; (must enforce continually); (the more top priority jobs, less response).

9. Do you upgrade or downgrade job priority automatically after the job has been in the system for a certain length of time without certain progress?

yes - 4

no - 4

If yes, what are the conditions? expiring funds; customer completion date; 1 year old; 9 months old; occasional review; if job not funded.

10. Do you have any limits of any sort on the number of customer jobs with respect to each priority?

yes - 2

no - 6

If yes, what are they? Percentage of priority "As". Monitor by volume in each priority; A - 1%, 1 - 5%, 2 - 2%, 3 - 41%, 4 - 33%; top priority review; overall percentage;

11. Do customers raise or request priority increases for the purpose of getting work done sooner?

frequently - 2

sometimes - 6

hardly ever - 0

12. Do you consider priority inflation to be a problem?

yes - 4

no - 4

If yes, why? deletes priority meaning inflation generates inflation; due to backlog/response pressures; lack of response due to constraints; can't have all top priorities.

13. Do you personally think that over the course of a job, the planners and estimators (P&Es) make too many trips to the job site?

yes - 0

no - 8

14. Does PWC take too long to produce a job plan?

yes - 3

no - 5

15. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes - 3

no - 4

should be more detail - 1

16. Please indicate to what degree your personal time is consumed with customers and,

	<u>none</u>	<u>some</u>	<u>alot</u>	<u>substantial</u>
questions on job status	<u>0</u>	<u>5</u>	<u>3</u>	<u>0</u>
cost overruns	<u>0</u>	<u>7</u>	<u>1</u>	<u>0</u>
scope variances/amendments	<u>0</u>	<u>7</u>	<u>1</u>	<u>0</u>
job scope	<u>1</u>	<u>6</u>	<u>1</u>	<u>0</u>
quality complaints	<u>0</u>	<u>6</u>	<u>2</u>	<u>0</u>
response complaints	<u>0</u>	<u>3</u>	<u>4</u>	<u>1</u>
requests to push jobs	<u>0</u>	<u>2</u>	<u>5</u>	<u>1</u>
priority increases	<u>0</u>	<u>8</u>	<u>0</u>	<u>0</u>

17. Are work request, TF-1s, sent back to the customers due to incomplete/inaccurate information?

frequently - 1

sometimes - 5

never - 2

18. In general, do customers put all known job information on the work request?

always - 0

frequently - 3

sometimes - 5

never - 0

19. Do customers complete their actions like providing additional information and design reviews, quickly and relative to job priority?

always - 0

frequently - 7

sometimes - 1

usually not - 0

20. Upon receipt of top priority jobs, do you compare contract and in-house accomplishment times?

always - 3

sometimes - 3

no, contract is always faster - 1

no, in-house is always faster - 1

no - 0

21. Does PWC overdesign jobs; that is provide more engineering than is necessary to get the work done?

yes - 5

no - 3

22. Does engineering take too long for the product produced?

yes - 4

no - 4

23. Do customers take too long to fund top priority jobs?

yes - 3

no - 5

24. Do customers know how the PWC system work and what its requirements are?

yes - 4

no - 4

25. Please indicate to what degree you use the following items.

	<u>Often</u>	<u>Sometimes</u>	<u>Hardly Ever</u>
commander's orders	<u>0</u>	<u>2</u>	<u>6</u>
unfunded job plan	<u>0</u>	<u>3</u>	<u>5</u>
advance material procurement	<u>0</u>	<u>5</u>	<u>3</u>
customer material priority	<u>3</u>	<u>3</u>	<u>2</u>
definitive designs	<u>1</u>	<u>4</u>	<u>3</u>
prefunded engineering accounts	<u>1</u>	<u>2</u>	<u>5</u>
performance contracts	<u>0</u>	<u>3</u>	<u>5</u>
project managment for jobs	<u>0</u>	<u>6</u>	<u>2</u>
shop secondary skills	<u>0</u>	<u>4</u>	<u>4</u>

26. Many people say that material is the biggest response problem with specific work. Do you agree?

agree - 5

disagree - 3

Why? Agree - procurement regulations/constraints (3); NAVSUP vs PWC
priorities; dollar limits; lead time; NSC Oakland

Disagree - one of many problems; shop backlog/scheduling bigger; engineering
bigger.

27. What can be done to improve material procurement response times?

increase local purchases (3); ease GSA requirements; increase inventories (4);
increase buyers (2); use IDTC (2); design for standard stock; change procure-
ment regulations.

28. Are PWCs too optimistic in the response goals which have been set?

yes -5

no -3

29. Do P&Es spend too much time producing fundable estimates?

yes -3

no -5

30. What changes can be made to improve response? better P&E

supervision (2); more personnel/less constraints (3); better PWC/customer
liaison; more engineers; set realistic goals; more contracts (2); better
contract decisions; better work input; more authority to shop foremen;
proper engineer grades; change purchase regulations!

31. What do think the top five problems are with specific work processing?

- a. material procurement (5); timely/accurately job plans (4); engineering
- b. support (3); poor customer scope (2); hot jobs; shop
- c. supervision; materials & methods old; poor PMS implementation;
- d. no "fast track" methods; P&E field work; customer liaison (2); no
- e. realistic goals; funding; priority inflation; inflated shop backlog.

32. What types of actions have you taken to improve response?

better work request screening (2); engineer PDs; P&E self evaluation;
more contracting; better planning; enforce priority system; better contract
decision; reorganization; educating customers; command interest for hot jobs;
more local purchases.

33. In general, is it faster to accomplish specific work by contract or in-house forces?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>2</u>	<u>8</u>
in-house	<u>8</u>	<u>6</u>	<u>0</u>

34. Which do customers prefer?

contract accomplishment - 3
in-house accomplishment - 0
depends - 5

35. Should more or less specific work be contracted?

more - 4
less - 1
okay now - 3

If more or less, please explain; less - but ceiling constraints;

more - maintenance service types; high backlog.

36. How you describe the specific work reports you receive?

Circle as appropriate.

they are okay - 2
too lengthy - 0
receive more than I need or use - 2
should be more concise - 0
I could use better information - 3
I could use more reports - 0
they don't give me the information I need - 1
I don't use them - 1

37. Do you attend meeting which waste your time?

yes - 5
no - 3

38. Do the various meeting concerning specific work coordinate decisions or information?

yes - 7
no - 1

39. Do you or your people screen customer work requests upon receipt for, (circle as appropriate)

proper completion - 7

adequate job scope information - 8

40. Additional comments. If you desire to make additional comments about specific work please do so below.

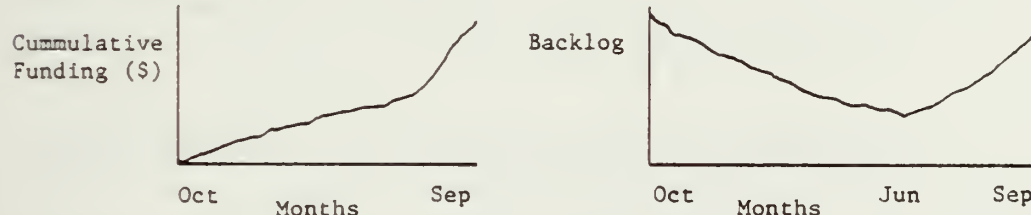
PWCs are in breakdown maintenance syndrome.

Production Management Office Head (Code 350) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg, LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best response which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). ON written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. In general, do your funding and backlog profile for the fiscal year look like the ones below? If no, please show yours.



2. Please rank by priority (1 is highest and 4 is lowest), the relative importance/precedence of each type of work.

emergency- service	___	1 - 0
minor	___	2 - 0
recurring	___	3 - 2
specific	___	4 - 6

3. In general, is it faster to accomplish specific work by contract or in-house forces?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>1</u>	<u>3</u>
in-house	<u>6</u>	<u>4</u>	<u>3</u>

4. Should more or less specific work be contracted?

more - 0
less - 3
okay now - 3

If more or less, please explain: less - higher costs (2);
quality; maintain in-house capability

5. Does PWC contract for the correct reasons?

yes - 4

no - 2

If no, please explain: ceiling constraints is main reason

6. Does PWC contract the correct types of jobs?

yes - 6

no - 0

If no, please explain: (N/A)

7. Upon receipt of top priority jobs, do you compare contract and in-house accomplishment times?

yes - 6

no - 0

8. As the amount of contracting increases, will PMS have to be changed to become more flexible or to reduce overhead?

yes - 4

no - 2

If yes, what type of changes do you think will be made? relocate personnel (2); PMS designed for in-house accomplishment.

9. For planning and contract decisions, should the shops specific work force be relatively stable throughout the year?

yes - 5

no - 0

10. Does your PWC normally have a significant year end dump?

yes - 5

no - 1

11. Is the year end dump a problem?

yes - 3

no - 3

12. Circle the items which you personally feel apply to the year end dump.

result from poor customer planning - 3

causes delays in PWC response - 6

allows balancing the workforce throughout the year- 1
is not a problem, has no effect on response- 1
causes contracting problems - 1
no fault of the local customers - 3
causes rushed and faulty estimates- 2
gives the PWC personnel extra work- 2

13. Are PWCs too optimistic in the response goals which have been set?
yes - 4
no - 2

If yes, why? unrealistic; no flexibility; personnel restrictions; not
consistent w/customer needs.

14. How do you feel about the specific work reports you receive?
Circle as appropriate.

they are okay - 3
too lengthy - 0
receive more than I need - 0
should be more concise - 0
I could use better information - 2
I could use more reports - 2
They don't give me the information I need - 2
I don't use them - 0

15. Do you attend meetings which waste your time?
yes - 4
no - 1

16. Do the various meetings concerning specific work coordinate
decisions and information?
yes - 5
no - 1

17. Is the specific work priority system satisfactory for making
work processing decisions and being responsive to the customer?
yes - 5
no - 1

If no, please explain: system must be managed; low priorities get
preempted; customer misuse

18. Do you consider priority inflation to be a problem?
yes - 4
no - 2

19. Do you personally feel that you spend a lot of time "spinning
your wheels"; that is doing things which the system should easily
accommodate?
yes - 2
no - 4

If yes, what are those things? putting out "fires"; educating
customers

20. Many people say that material is the biggest response problem for specific work. Do you agree?

agree - 3

disagree - 3

Why? Agree - procurement regulations (2); lead time.

Disagree - problem, but not biggest. One of several problems (2).

21. What can be done to improve material response times? Increase
open purchase authority; advance planning and followup; change procurement
regulations (2); increase inventory levels;

22. What can be done to reduce or eliminate job starts slips due to material not on board? more realistic lead dates; more customer
liaison; better planning; increase material storage (2); maintain greater
backlog.

23. Do you start jobs without 100% of the material on-hand?

frequently - 4

sometimes - 2

never - 0

24. What can be done to reduce or eliminate job start slips due to manpower nonavailability? increase ceilings; reduce number of hot
jobs (2); use fixed workforce; effective shop loading (2); level funding;
reduce variances.

25. What is the lowest shop day backlog figure which you feel PWC can have without the shops running out of work or having an uneven trade balance? 90; 115; 130; 150; 225; 315.

26. Do you have backlog goals other than the 150 shop days at the end of the third quarter?

yes - 1

no - 5

If yes, what are they? 60 - 90 days

27. Is "shop days" a good backlog measure since it's determined with the variable figure of the number of persons working specifics?

yes - 6

no - 0

If no, what would be a better measure? _____

28. When the specific work backlog reaches a certain amount, is contracting increased to maintain response?

yes - 4

no - 1

If yes, what is that amount? 6 mos. backlog; >120 days; 150 days.

If no, how do you make contracting decisions based upon backlog? capability, response; backlog (2).

29. Please indicate below your in-house response information for the average job. Also please indicate what your response goals are. Use calendar days with 30 days to the month.

	actual response by priority			response goals by priority		
	(A)	(1-2)	(3-4)	(A)	(1-2)	(3-4)
	top	high	routine	top	high	routine
fundable estimate	—	—	—	—	—	—
engineering	—	—	—	—	—	—
job plan	—	—	—	—	—	—
material procurement	—	—	—	—	—	—
shop accomplishment	—	—	—	—	—	—
total(without funding)	—	—	—	—	—	—

30. What changes can be made to improve PWC response? reduce material procurement time (3); start job only with 100% material; fix price more work; increase personnel (2); educate PWC/customer personnel; better planning (3); reduce over planning; new work methods; better job coordination; use PMS more.

31. How can PWC productivity be improved? better customer liaison; increase ceiling; use temporary help; reduce scheduling interferences; reduce scope changes; offer employee incentive; training

32. What types of actions have you taken to improve response? monitor hot jobs; better P&E staffing; more AE use (2); more contracts (2); use PMS reports; workload analysis (2); proper priorities; material followup action; more EPS; follow schedules.

33. What do you think the top five problems are with specific work processing?

- material procurements (6); poor customer planning (6); staffing
- constraints (4); hot job preemption (3); instabilized work force (2);
- engineering; proper priorities; training; material staging;
- poor equipment; year end dump; timely reports; start
- job w/o material; poor P&E/shop communication.

34. Please indicate to what degree you use the following items.	<u>often</u>	<u>sometimes</u>	<u>hardly ever</u>
commander's order	<u>0</u>	<u>3</u>	<u>3</u>
unfunded job plan	<u>2</u>	<u>4</u>	<u>0</u>
advance material procurement	<u>2</u>	<u>3</u>	<u>1</u>
customer material priority	<u>2</u>	<u>3</u>	<u>1</u>
definitive designs	<u>1</u>	<u>2</u>	<u>2</u>
prefunded engineering accounts	<u>4</u>	<u>0</u>	<u>1</u>
performance contracts	<u>2</u>	<u>1</u>	<u>2</u>
project management on jobs	<u>2</u>	<u>3</u>	<u>1</u>
shop secondary skills	<u>2</u>	<u>4</u>	<u>0</u>

35. Please indicate to what degree your personal time is consumed with customers and,

	<u>none</u>	<u>some</u>	<u>alot</u>	<u>substantial</u>
questions on job status	<u>0</u>	<u>1</u>	<u>1</u>	<u>4</u>
cost overruns	<u>0</u>	<u>4</u>	<u>1</u>	<u>1</u>
scope variance/amendments	<u>0</u>	<u>1</u>	<u>4</u>	<u>1</u>
job scope	<u>0</u>	<u>4</u>	<u>1</u>	<u>1</u>
quality complaints	<u>1</u>	<u>4</u>	<u>0</u>	<u>1</u>
response complaints	<u>0</u>	<u>3</u>	<u>2</u>	<u>1</u>
requests to push jobs	<u>0</u>	<u>0</u>	<u>4</u>	<u>2</u>
priority increases	<u>0</u>	<u>2</u>	<u>3</u>	<u>4</u>

36. Does PWC overdesign jobs; that is provide more engineering than is necessary to get the job done?

yes - 5
no - 1

37. Does engineering take too long for the product produced?

yes - 5
no - 1

38. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes - 2
no - 2
should provide more - 2

39. Does PWC take too long to produce a job plan?

yes - 4
no - 2

40. Additional comments. Please make additional comments concerning specific work management below and on a separate sheet of paper.

N/A

Work Programming Control Head (Code 351) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. PALMBORG, LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best response which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise indicated. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. Do you or your people screen customer work requests upon receipt for, (circle as appropriate).
proper completion - 6
adequate job scope information - 5

2. Do the customers know how the PWC system works and what its requirements are?
yes - 6
no - 1

3. Do customers raise or request priority increases for the purpose of getting work done sooner?
frequently - 1
sometimes - 6
hardly ever - 0

4. Do you consider priority inflation to be a problem?
yes - 3
no - 4

If yes, why? effect on schedule and backlog; customers cry "wolf";
only if job is short fused.

5. Do customers complete their action such as funding, providing additional information, and design reviews, quickly and relative to job priority?
always - 0
frequently - 4
sometimes - 2
usually not - 1

6. Please indicate to what degree of your personal time is consumed with customers and,

	none	some	alot	substantial
questions on job status	<u>0</u>	<u>3</u>	<u>2</u>	<u>2</u>
cost overruns	<u>1</u>	<u>4</u>	<u>1</u>	<u>1</u>
scope variances/amendments	<u>0</u>	<u>5</u>	<u>1</u>	<u>1</u>
job scope	<u>0</u>	<u>6</u>	<u>1</u>	<u>0</u>
quality complaints	<u>1</u>	<u>6</u>	<u>0</u>	<u>0</u>
response complaints	<u>0</u>	<u>4</u>	<u>3</u>	<u>0</u>
requests to push jobs	<u>0</u>	<u>2</u>	<u>2</u>	<u>2</u>
priority increases	<u>0</u>	<u>5</u>	<u>1</u>	<u>1</u>

7. Are customer scope changes and amendments a problems?

yes - 3

no - 4

If yes, what can be done to reduce/eliminate them? _____

better customer planning (2); better customer information

8. Are PWCs too optimistic in the response goals which have been set?

yes - 2

no - 5

9. How do you describe the specific work reports you receive?

Circle as appropriate.

they are okay - 6

too lengthy - 0

receive more than I need/use - 0

should be more concise - 0

I could use more reports - 0

I could use better reports - 2

They don't give me the information I need - 1

I don't use them - 0

10. Do you attend meetings which waste your time?

yes - 2

no - 5

11. Do the various meetings concerning specific work coordinate decisions and information?

yes - 6

no - 0

12. Many people say that material is the biggest response problem with specific work. Do you agree?

agree - 5

disagree - 2

Why? Agree - restrictive procurement regulations; BPA limits too low;

effects start dates; effects backlog; need material to proceed; long lead

times (2);

Disagree - one of many; poor planning causes material problems.

13. What can be done to reduce or eliminate job start slips due to material not on-board? change procurement regulations (2); better delivery dates; better purchases; better followup; better planning; substitute materials; borrow material from other jobs; start jobs only with 100% material; increase inventory levels.

14. In general, is it faster to accomplish specific work by contract or in-house forces? Indicate which is faster by priority.

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>0</u>	<u>5</u>
in-house	<u>7</u>	<u>6</u>	<u>2</u>

15. Is writing contract specifications a problem for response?

yes - 2
no - 4

16. Which do customers prefer?

contract - 1
in-house - 6

17. Should more or less specific work be contracted?

more - 0
less - 1
okay now - 6

18. Does PWC overdesign jobs; that is provide more engineering than is necessary to get the job done?

yes - 1
no - 5

19. Does engineering take too long for the product produced?

yes - 2
no - 5

20. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes - 1
no - 3
should provide more - 3

21. Does PWC take too long to produce a job plan?

yes - 3
no - 4

22. Do planners and estimators (P&Es) spend too much time producing fundable estimates?

yes - 3
no - 3

23. What unit of measure do you use to measure backlog for each functional area?

fundable estimate	<u>manweeks;days;</u>
engineering	<u>manweeks;days;</u>
job plan	<u>manweeks;days;</u>
material procurement	<u>\$;days;</u>
shops	<u>manhours;hours;</u>

24. What actions are taken if backlog exceeds targets or gets too large in each area?

fundable estimate overtime (4); use temporaries (2); notify customer
 engineering overtime (4); contract (2); notify customer
 job plan overtime (4); use temporaries (2); contract
 material procurement overtime (2); substitute material (3)
 shops overtime (4); use temporaries (3); contract

25. How accurate, estimated versus actual, are the respective manpower availability projections used for scheduling?

	<u>always</u>	<u>frequently</u>	<u>sometimes</u>	<u>hardly ever</u>
job plan	<u>1</u>	<u>4</u>	<u>2</u>	<u>0</u>
engineering	<u>1</u>	<u>4</u>	<u>2</u>	<u>0</u>
shops	<u>1</u>	<u>3</u>	<u>3</u>	<u>0</u>

26. Approximately, and in your opinion, to what degree are job start dates slipped due to the following reasons?

	<u>frequently</u>	<u>sometimes</u>	<u>hardly ever</u>
equipment not available	<u>1</u>	<u>3</u>	<u>3</u>
material not available	<u>4</u>	<u>3</u>	<u>0</u>
manpower not available	<u>1</u>	<u>5</u>	<u>1</u>
higher priority job	<u>1</u>	<u>6</u>	<u>0</u>
customer amendment	<u>0</u>	<u>5</u>	<u>1</u>
other (specify)	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>

27. Can job start dates be initially set so that no reloading occurs and still be responsive to the customer?

yes - 4

no - 2

Why or why not? Yes - eliminate material and manpower problems (2);

proper shop loading.

No - delivery dates change (2).

28. What can be done to reduce or eliminate shop load slips due to manpower nonavailability? increase ceilings (2); increase use of

temporaries; reduce customer scope changes; minimize schedule changes;

better shop supervision; enforce shop schedule; more contracts (2); adjust shop
trade mix; stabilize workforce.

29. What are the bottlenecks in the specific work processing flow of work? Circle as appropriate.

fundable estimate - 1

funding - 3

engineering - 2

job plan - 3

material procurement - 6

shop work - 2

contract specifications - 2

scope changes/amendments - 3

30. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 1
no - 6

31. Do you start jobs without 100% of the material on-hand?

frequently - 1
sometimes - 6
never - 0

45 (3)

60 (1)

32. How much time do you normally plan for material procurement? 65 (1)

33. What changes can be made to improve PWC response? better/faster material procurement (3); better job plan/design (3); improve communications and supervision; start jobs only with all material; eliminate paperwork; increase material inventories; enforce priority system; stabilize workforce; year end dump planning; use open end contracts; increase engineering response; more ceiling.

34. How can productivity be improved? increase ceilings; use temporaries; reduce customer scope changes; improve morale; training (2); better supervision; enforce EPS in field; use PMS; upgrade equipment and methods; contract routine jobs.

35. What types of actions have you taken to improve response? initiate workload analysis; more P&Es; use AEs; more contracts; monitor top priority jobs; improve communication (4); improve quality; more customer liaison (2).

36. What do you think the top five problems are with specific work processing?

- a. work input (2); reports (2); top priority job inflation (2); engineering (2);
- b. material procurement; start job without all material; job planning; variance
- c. estimates; backlog of funded work; shop load slips; slow response; P&E
- d. technical knowledge; shuffling paperwork; customer planning; customer
- e. scope changes; ceiling constraints.

37. Do customers take too long to fund top priority jobs?

yes - 1
no - 6

38. Additional comments. Please feel free to make additional comments about specific work below and on a separate sheet.

N/A

Work Execution Control Head (Code 352) Questionnaire

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Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best response which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. Once the field work begins, the job progresses smoothly without problems or delays.

agree - 0

disagree - 3

If you disagree, why? material requirements (3); manpower availability;
customer interference/changes (3).

2. Many people say the material is the biggest response problem with specific work. Do you agree?

agree - 3

disagree - 0

Why? Agree - material lead time (2); crash jobs take precedent

3. What can be done to reduce or eliminate job start slips due to material not on board? use local purchase authority; don't start jobs without all material; change procurement regulations.

4. Is job site material security a problem?
yes - 2
no - 1
5. Are the material items lost on the job site a significant cause of delays in the schedule?
yes - 0
no - 3
6. In general, is it faster to accomplish specific work by contract or in-house forces?
contract - 1
in-house - 1
depends - 1
7. Does PWC contract the correct types of jobs?
yes - 2
no - 0
8. Does PWC contract for the correct reasons?
yes - 2
no - 0
9. Should more or less specific work be contracted?
more - 0
less - 2
okay now - 1
10. How do you describe the specific work reports you receive?
Circle as appropriate.
they are okay - 3
too lengthy - 0
receive more than I need - 0
should be more concise - 0
I could use better information - 0
I could use more reports - 0
They don't give me the information I need - 0
I don't use them - 0
11. Do you attend meeting which waste your time?
yes - 1
no - 2
12. Do the various meetings concerning specific work coordinate decisions and information?
yes - 3
no - 0
13. Please indicate to what degree of your personal time is consumed with customers and,
- | | none | some | alot | substantial |
|----------------------------|----------|----------|----------|-------------|
| questions on job status | <u>0</u> | <u>0</u> | <u>1</u> | <u>2</u> |
| cost overruns | <u>0</u> | <u>2</u> | <u>0</u> | <u>1</u> |
| scope variances/amendments | <u>0</u> | <u>0</u> | <u>1</u> | <u>2</u> |
| job scope | <u>0</u> | <u>1</u> | <u>2</u> | <u>0</u> |
| quality complaints | <u>0</u> | <u>3</u> | <u>0</u> | <u>0</u> |
| response complaints | <u>0</u> | <u>3</u> | <u>0</u> | <u>0</u> |
| requests to push jobs | <u>0</u> | <u>1</u> | <u>2</u> | <u>0</u> |
| priority increases | <u>0</u> | <u>3</u> | <u>0</u> | <u>0</u> |

14. Are customer scope changes and amendments a problem?

yes - 3

no - 0

If yes, what can be done to reduce or eliminate them? _____

improve P&E skill; forbid changes; fix price more jobs.

15. Is there much job site customer interference?

yes - 1

no - 2

16. Are there many job amendments after the job starts?

yes - 2

no - 1

17. Could these amendments have been resolved by P&Es, engineers, or the customer prior to the start of the job, or are they unforeseen?

could have been resolved by the customer - 0

could have been resolved by the P&Es - 1

could have been resolved by the engineers - 0

unforeseen - 1

18. Could rework be minimized with better job planning?

yes - 2

no - 1

19. Does rework result solely from the shops actions?

yes - 1

no - 2

If no, what are the other causes? poor planning (2); poor materials

(2); engineering.

20. Is the job sign off a problem?

yes - 1

no - 2

If yes, does the problem rest with the customer?

yes - 1

no - 0

21. Is there a problem with unauthorized customer field representatives getting the shops to the job scope?

yes - 1

no - 2

22. Do you or your people spend much time investigating variances?

alot - 3

alittle - 0

hardly any - 0

23. Do P&Es or engineers investigate variances?

yes - 1

no - 2

24. Recognizing variances are problems, what can be done to reduce or eliminate them? improve P&E skill; better/more visible cost information

25. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 0

no - 3

26. Are there many changes between the shop load start date and the actual start date?

yes - 2

no - 1

If yes, please list the main reasons: customer interference;
noncompliance with schedule; weather; low ceilings; material lead time;
manpower availability.

27. What can be done to reduce or eliminate job start slips due to manpower nonavailability? good trade balance; use more temporaries

28. What type of detailed information does the job plan provide the shops?

too much - 0

too little - 1

sufficient - 2

29. For the amount of effort in producing the very detailed schedules, are there too many inaccuracies, variances, and/or changes?

yes - 1

no - 2

30. What can be done to reduce the number of schedule changes?

enforce shop job plan compliance (2); better job plans; start job only with
all material; reduce in progress job scope changes; use PMS.

31. What can be done to reduce the number of inprogress jobs stopped for some reason? faster customer adjustment funding; use local
purchase authority for in progress jobs.

32. What are the bottlenecks in the specific work processing system? Circle as applicable.

fundable estimate -0	scope changes/amendments -1	job plan -0
material procurement -3	funding -2	shop work -1
contract specifications -0	engineering -0	

33. What changes can be made to improve PWC response? change
procurement regulations (2); increase contracting.

34. How can PWC productivity be improved? shop compliance with EPS/
job plan; improve P&E skill; better shop span of control.

35. What types of actions have you taken to improve response?
daily scheduling meetings; schedule older jobs first; prorate effort to
customer business.

36. What do you consider the top five problems are with specific
work processing?

- a. poor estimates; material lead times; shop trade mix; priority inflation;
- b. customer interference; timely reports; ceiling constraints; manual ADP.
- c.
- d.
- e.

37. Additional comments. Please write additional comments below
and on a separate sheet.

N/A

Maintenance Engineering Department (Code 400) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg. LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. Please rank by priority (1 is highest and 4 is lowest), the relative importance/precedence of each type of work.

emergent-service	_____	1 - 0
minor	_____	2 - 1
recurring	_____	3 - 1
specific	_____	4 - 0

2. Please indicate to what degree you use the following items.

	<u>often</u>	<u>sometimes</u>	<u>almost never</u>
commander's order	<u>0</u>	<u>3</u>	<u>5</u>
unfunded job plan	<u>3</u>	<u>2</u>	<u>3</u>
advance material procurement	<u>2</u>	<u>4</u>	<u>2</u>
customer material priority	<u>2</u>	<u>5</u>	<u>1</u>
definitive designs	<u>2</u>	<u>4</u>	<u>1</u>
prefunded engineering accounts	<u>4</u>	<u>3</u>	<u>1</u>
performance contracts	<u>3</u>	<u>3</u>	<u>2</u>
project management on jobs	<u>2</u>	<u>4</u>	<u>2</u>
shops secondary skills	<u>2</u>	<u>2</u>	<u>2</u>

3. Please indicate to what degree your personal time is consumed with customers and,

	<u>none</u>	<u>some</u>	<u>alot</u>	<u>substantial</u>
questions on job status	<u>1</u>	<u>7</u>	<u>0</u>	<u>0</u>
cost overruns	<u>0</u>	<u>7</u>	<u>1</u>	<u>0</u>
scopevariance/amendments	<u>0</u>	<u>5</u>	<u>3</u>	<u>0</u>
job scope	<u>0</u>	<u>4</u>	<u>4</u>	<u>0</u>
quality complaints	<u>0</u>	<u>6</u>	<u>2</u>	<u>0</u>
response ccmlaints	<u>1</u>	<u>5</u>	<u>2</u>	<u>0</u>
requests to push jobs	<u>0</u>	<u>7</u>	<u>5</u>	<u>1</u>
priority increases	<u>0</u>	<u>5</u>	<u>3</u>	<u>0</u>

4. When fundable backlog increases, what type of actions do you take to decrease it? none; use temporary P&Es (3); work over-time (4); contract (2); use open ended maintenance contracts.

5. Should the fundable estimate be written to become part of the job plan?

yes - 4
no - 4

6. Is much P&E time consumed in determining the scope of the job rather than estimating?

alot - 5
some - 2
not much - 0

7. What is your basic contracting policy? contract jobs over \$200,000; maintain backlog to keep shops busy; maintain 75 shopday backlog; consider various items such as economics, capability, response, and backlog (5).

8. Who makes the contracting decisions? Please specify code and limits as applicable. 350; 350/400(2); 350 w/400/420; 350 w/420; 500, 350, 400, 30; customer

9. In general, is it faster to accomplish specific work by contract or in-house forces?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>1</u>	<u>1</u>	<u>6</u>
in-house	<u>7</u>	<u>7</u>	<u>2</u>

10. Is writing contract specifications a response problem?

yes - 6
no - 2

11. Should more or less specific work be contracted?

more - 3
less - 2
okay now - 3

If more or less, please explain: Less - better response/control; manpower availability.

More - if other work is backlogged; reduce backlog; but, year end dump prevents; manpower availability.

12. Does PWC contract the correct type of jobs

yes - 8
no - 0

If no, please explain: N/A

13. Does PWC contract for the correct reasons?

yes - 6

no - 2

If no, please explain: contract for lack of manpower only (3).

14. Upon receipt of top priority jobs, do you compare contract and in-house accomplishment times?

always - 2

sometimes - 2

no, contract is always faster - 0

no, in-house is always faster - 2

never - 2

15. Many people say that material is the biggest response problem for specific work. Do you agree?

agree - 6

disagree - 2

Why? Agree - fast procurement not permitted; long lead times (2);
procurement regulations (2); customer ignorance of procurement regulations.
Disagree - engineering is bigger problem; only problem if funded backlog
decreases.

16. What can be done to improve material response times? increases
inventories (3); contract for material (2); increase purchase authority (4);
advance procurement; rapid hiring; blacklist non-responsive vendors.

17. What can be done to reduce or eliminate job starts slips due to material not on-board? start job with all material on hand (4);
use more local purchase authority; better planning; few slips due to material.

18. As the amount of contracting increases, do you think that PMS will have to be changed to be flexible and to reduce overhead?

yes - 5

no - 0

If yes, what types of changes must be made? reduce overhead
costs (3); reduce controls; change response targets; PMS devoted to in-
house accomplishment.

19. Do you feel that you spend a lot of time "spinning your wheels"; that is doing things which the system should easily accommodate?

yes - 2

no - 5

If yes, what are those things? customer liaison matters;

paperwork shuffling

20. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 4

no - 4

21. What are the bottlenecks in the specific work processing flow of work? Circle as applicable.

fundable estimate - 3

funding - 5

engineering - 6

job plan - 3

material procurement - 8

shop work - 3

contract specifications - 3

scope changes/amendments - 5

others (specify) poor customer planning; customer funding.

22. Do you think that over the course of a job, P&Es make too many trips to the job site?

yes - 0

no - 8

23. Does PWC overdesign jobs; that is provide more engineering than is necessary to get the job done?

yes - 3

no - 5

24. Does engineering take too long for the product produced?

yes - 4

no - 4

25. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes - 5

no - 3

should provide more

26. Does PWC take too long to produce a job plan?

yes - 3

no. - 5

27. Circle the items you feel apply to the year end dump.

results from poor customer planning - 5

causes delays in PWC response - 8

allows balancing the workforce throughout the year - 2

is not a problem, has no effect on response - 1

causes contracting problems - 2

no fault of the local customers - 4

causes faulty estimates and job variances - 4

gives PWC personnel extra work - 3

28. Please indicate below your response information for the average job. Also indicate what your response goals are. Use calendar days with 30 days to the month.

	actual response (by priority)			response goals (by priority)		
	(A)	(1-2)	(3-4)	(A)	(1-2)	(3-4)
	top	high	routine	top	high	routine
fundable estimate	—	—	—	—	—	—
engineering	—	—	—	—	—	—
job plan	—	—	—	—	—	—
material procurement	—	—	—	—	—	—
total (without funding)	—	—	—	—	—	—

29. Are PWCs too optimistic in the response goals which have been set?
yes - 6
no - 1

If yes, why? ceiling/overhead restrictions (3); year end dump (2);
long lead times; "Hot" jobs; continual backlog; goals not related to
resources; goals are unrealistic.

30. Do you attend meeting which waste your time?
yes - 6
no - 2

31. Do the various meeting concerning specific work coordinate decisions and information?
yes - 6
no - 0

32. What changes can be made to improve PWC response? eliminate
ceiling restrictions (2); allow/increase local purchases (2); eliminate
year end dump; minimize "Hot" jobs; enforce priority system; remove hiring
constraints; better customer planning; increase P&E/engineers; eliminate
paperwork.

33. How can PWC productivity be increased? improve management; reduce
supervisors administrative duties; better response goals; employee incentives;
better customer liaison; better planning coordination; better/more supervision
(2); use EPS; improve equipment/work methods; PMS does nothing for shop
productivity.

34. What do you think the top five problems are for specific work processing?
a. customer planning/changes (4); complicated planning (2); funding; year
b. end dump; material (2); scheduling (2); management (2); work input;
c. contracting decisions; overdesign; staffing mix; timely reports; ceiling
d. constraints; material staging; paperwork (2); "hot" jobs; quality;
e. engineering practicality; number of engineers.

35. What types of actions have you taken to improve response? emphasize response targets (2); more AE contracts; P&E standards/incentives (2);
job plan accuracy; eliminate paperwork; use overtime; establish PMS; improve
working conditions; more training; job coordination; more customer liaison;
more people; better supervision; same P&E on estimate/job plan.

36. Are personnel shortages really problems, or are we just not innovative enough in our management?

problem - 3

not innovative enough - 0

some of both - 4

37. Additional comments are encouraged. Please use the space below and separate sheets.

N/A

Production Engineering Head (Code 420) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg. LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. How do you describe the specific work reports you receive?

Circle as applicable.

they are okay - 1

too lengthy - 0

receive more than I need or use - 0

Should be more concise - 0

I could use better information - 4

I could use more reports - 0

They don't give me the information I need - 3

I don't use them - 0

2. Do you attend meetings which waste your time?

yes - 3

no - 3

3. Do the various meetings concerning specific work coordinate decisions and information?

yes - 5

no - 0

4. Do the customers know how the PWC system works and what its requirements are?

yes - 1

no - 5

5. Are customer scope changes and amendments a problem?

yes - 5

no - 1

If yes, what can be done to reduce or eliminate them? determine

problem rather than fix; poorly written work requests (2); better customer

planning; better project preparations; proper planning (engineering).

6. Do customers raise or request priority increases for the purpose of getting work done sooner?

frequently - 2
sometimes - 4
almost never - 0

7. Some customers complain that production engineering over-designs jobs; that is provide more engineering than is necessary to get the job done. Do you agree?

agree - 2
disagree - 4

8. Does engineering take too long for the product produced?

yes - 1
no - 5

9. Do customers complete their actions such as providing additional information and design reviews, quickly and relative to job priority?

frequently - 2
sometimes - 4
usually not - 0

10. Please indicate to what degree of your personal time is consumed with customers.

	<u>none</u>	<u>some</u>	<u>alot</u>	<u>substantial</u>
questions on job status	<u>0</u>	<u>6</u>	<u>0</u>	<u>0</u>
cost overruns	<u>1</u>	<u>5</u>	<u>0</u>	<u>0</u>
scope changes/amendments	<u>0</u>	<u>4</u>	<u>2</u>	<u>0</u>
job scope	<u>0</u>	<u>3</u>	<u>2</u>	<u>1</u>
quality complaints	<u>3</u>	<u>3</u>	<u>0</u>	<u>0</u>
response complaints	<u>1</u>	<u>5</u>	<u>0</u>	<u>0</u>
requests to push jobs	<u>0</u>	<u>6</u>	<u>0</u>	<u>0</u>
priority increases	<u>2</u>	<u>4</u>	<u>0</u>	<u>0</u>

11. Do your designs normally reflect/use material which is readily available?

yes - 4
no - 2

12. Are your engineers kept informed of what material is readily available in shop store?

yes - 5
no - 1

13. Are PWCs too optimistic in the response goals which have been set?

yes - 5
no - 1

If yes, why? engineering goals unrealistic (2); continual backlog;
uncontrollable constraints; customer actions; ceiling constraints.

14. Do you have an engineering backlog target to which AE contracting is increased for response purposes?

3 yes- What is it? 4, 12 weeks
3 no

15. Please indicate below your response information for the average job. Also please indicate your response goals. Use calendar days with 30 to a month.

	actual response (by priority)			response goals (by priority)		
	(A)	(1-2)	(3-4)	(A)	(1-2)	(3-4)
	top	high	routine	top	high	routine
	_____	_____	_____	_____	_____	_____
engineering						

	top priority(A)	high priority(1-2)	routine(3-4)
AE contract	90,92,120	92,145,150	92,200,330
in-house	10,17,30,53	15,35,55,70	20,35,55,120

17. Is writing contract specifications a response problem?
yes - 4
no - 1

18. Do customers prefer design work by contract or in-house engineers?
contract - 0
in-house - 5

	top priority(A)	high priority(1-2)	routine(3-4)
in-house	5	5	2
contract	0	0	3

20. Should more design work be contracted for response reasons?
yes - 0
no - 5

Why? no - poor contractor products (2); EFD designs take time; cost;
requires in-house engineer time.

21. Should more or less specific work be contracted?
more - 0
less - 3
okay now - 2

If more or less, why? less - PWC costs less (2); PWC takes less
time; difficulty in specification/scope writing.

22. The cost of and the time of completion for a specific job is determined by the material specified in the design. Do you agree?
agree - 3
disagree - 3

23. How do your engineers determine if the material cost and delivery times are minimized in any design? cost comparison (2);
experience (3); extent of work; value engineering; "don't" results in
less optimum design.

24. What describes your feelings about the scheduling of engineering jobs? Circle as applicable.

- receive too many - 2
- receive too few - 1
- get only the messy jobs - 1
- scheduling doesn't reflect task of engineering - 2
- should not schedule - 1
- it's okay - 1
- too many higher priority additions - 3

25. Do you compare the planned engineering schedule to the actual output?

- yes - 4
- no - 1

If yes, what degree of accuracy do you have? 75 - 85;

80; 95%

26. What do you use to measure efficiency; i.e., P&E hours to job hours on job plans? average hours; improvement; status report;

estimate vs actual hours; quality and quantity.

27. Do you know what your workload will be for future weeks?

- yes - 4
- no - 2

28. Do you receive many customer design reviews back requiring rework?

- frequently - 1
- sometimes - 1
- almost never - 4

29. Do your engineers spend time determining job scope- scope, not design alternatives?

- substantial - 2
- alot - 2
- some - 2
- almost none - 0

30. Approximately what percentage of the engineers time is spent on consultation? 7, 15, 17, 20

31. What percentage of the engineers time is nonproductive; spent on nonengineering design matters such as training? 3, 5, 10, 12

32. What changes can be made to improve your response? hire experienced engineers (3); proper pay/grade (3); more engineers/draftsmen (2); better customer planning; improve as-builts; increase P&E technical knowledge; cut investigations; design only funded work; restrict specific work to maintenance and repair jobs only.

33. How can your productivity be improved? use flexitime; training;
better working spaces; computer: cut administrative duties; better wages;
better working atmosphere.

34. What types of actions have you taken to improve response? monitor
progress (2); motivate engineers; maximum effort on hot jobs; defer/contract
routine jobs; monitor hot jobs; review work input; enforce time estimates; use
AE contracts; use overtime.

35. What do you think the top five problems are with specific work processing?

- a. restrictive regulations/materials (3); paperwork (2); engineer hour
- b. estimates (2); poorly written work requests (2); external interference;
- c. inefficient organization; preliminary planning; weather; planning
- d. backlog; funding constraints; poor recurring maintenance produces
- e. specific work; poor field supervision; material substitution; lack of
communications; work request flow.

36. Additional comments are solicited below about specific work.

N/A

Planning and Estimating Division Head (Code 430) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg. LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. How do you describe the specific work reports you receive?
Circle as applicable.
they are okay - 2
too lengthy - 0
receive more than I need or use - 1
should be more concise - 3
I could use better information - 2
I could use more reports - 0
they don't give me the information I need - 1
I don't use them - 0
2. Do you attend meetings which waste your time?
yes - 2
no - 5
3. Do the various meetings concerning specific work coordinate decisions and information?
yes - 6
no - 1
4. In general, do customers put all known job information on the work request, TF-1?
always - 0
frequently - 0
sometimes - 7
never - 0
5. Does an improperly completed TF-1 add to the P&Es time?
yes - 6
no - 1

6. Please indicate to what degree of your personal time is consumed with customers and,

	<u>none</u>	<u>some</u>	<u>alot</u>	<u>substantial</u>
questions on job status	<u>0</u>	<u>6</u>	<u>0</u>	<u>1</u>
cost overruns	<u>1</u>	<u>5</u>	<u>1</u>	<u>0</u>
scope variances/amendments	<u>0</u>	<u>3</u>	<u>3</u>	<u>1</u>
job scope	<u>1</u>	<u>4</u>	<u>2</u>	<u>0</u>
quality complaints	<u>1</u>	<u>6</u>	<u>0</u>	<u>0</u>
response complaints	<u>1</u>	<u>4</u>	<u>1</u>	<u>1</u>
requests to push jobs	<u>0</u>	<u>4</u>	<u>2</u>	<u>1</u>
priority increases	<u>1</u>	<u>6</u>	<u>0</u>	<u>0</u>

7. Do customer raise or request priority increases for the purpose of getting the job done sooner?

yes - 7
no - 0

8. Are customer scope changes and amendments a problem?

yes - 4
no - 3

If yes, what can be done to reduce or eliminate them?

customer planning; good work input; eliminate customer indecision; fix
price more jobs.

9. Do you provide customer requested scoping estimates?

yes - 5
no - 2

10. Approximately how many manyears of effort are devoted to customer requested scoping estimates? 1; 0; 3; 4

11. Can customer requested scoping estimates be eliminated?

yes - 4
no - 3

If no, can they be handled over the phone?

yes - 2
no - 2

12. When the fundable estimate backlog increases, what type of actions do you take to decrease it? temporary assignments (5);
overtime (6); sacrifice quality with speed.

13. Should fundable estimates be written to become part of the job plan?

yes - 5
no - 2

14. Does anyone monitor the accuracy of the fundable estimate?

useless to do - 2
yes - 5
no - 0

15. Are fundable estimates compiled by,

one P&E - 2
different trade P&Es - 5

16. Does PWC overplan jobs; that is provide more job plan detail than is necessary to get the job done?

yes - 2

no - 5

should provide more - 0

17. Does PWC take too long to produce a job plan?

yes - 1

no - 6

18. Does PWC take too long to produce a fundable estimate?

yes - 1

no - 6

19. Do the P&Es help the customers determine job scope,

frequently - 5

sometimes - 2

hardly ever - 0

20. Do job plans normally reflect/use material which is readily available?

yes - 6

no - 1

21. Are the P&Es kept informed of what material is readily available in shop stores?

yes - 7

no - 0

22. In general, is it faster to accomplish specific work by contract or in-house forces?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>0</u>	<u>4</u>
in-house	<u>7</u>	<u>7</u>	<u>3</u>

23. Should more or less specific work be contracted?

more - 0

less - 1

okay now - 6

If more or less, why? _____

24. Does PWC contract the correct type of jobs?

yes - 7

no - 0

If no, please explain. _____

25. Do EPS make job plan writing any faster?

yes - 0

no - 7

26. Does PWC contract for the correct reasons?

yes - 7

no - 0

If no, please explain. _____

27. Are PWCs too optimistic in the response goals which have been set?

yes - 2

no - 5

28. Please indicate below your response information, both actual and goals, Use calendar days with 30 to a month.

	actual response (by priority)			response goals (by priority)		
	(A)	(1-2)	(3-4)	(A)	(1-2)	(3-4)
	top	high	routine	top	high	routine
fundable estimate	___	___	___	___	___	___
job plan	___	___	___	___	___	___

29. If you could, what changes would you make to the scheduling process? enforce priority system; schedule by individual use trade.

30. What unit of measure do you use for backlog?

fundable estimate: manhours, manweeks; dollars; number of work requests

job plan: manhours, manweeks; dollars; number of work requests

31. When the job plan backlog increases significantly, what do you do to reduce it? overtime (6); temporary assignment (5)

32. Do you think that over the course of the job, P&Es make too many trips to the job site?

yes - 0

no - 7

33. Do you compare the planned schedule to the actual job plan output?

yes - 5

no - 2

34. Do P&Es spend much time on amendments or variances for specific jobs being worked on by the shops?

alot - 1

some - 6

hardly any - 0

35. What changes could be made to improve your response? good
work request information (3); improve scheduling; better job scope; good
inspection reports; matching old equipment reports; eliminate variances;
improve material procurement;

36. How can your productivity be increased? use same P&E for estimates/
job plan; reduce overplanning; minimize sketches; use estimate manual vice
EPS; enforce priority system; customer liaison; adequate transportation;
reduce customer amendments; eliminate scoping estimate; good work request
information (3); material procurement; cut material research time.

37. What types of actions have you taken to improve response?
eliminate meeting; hold coordination meetings; use temporaries; use overtime;
customer education; implement ideas; improve customer liaison; zero backlog
concept.

38. What do you think the top five problems are with specific work processing?

- a. lack of customer information/decision (4); use of EPS (2); customer
- b. changes (2); scheduling (2); material pricing; restrictive procedures;
- c. office layout; job cost contract; material procurement (2); timely reports;
- d. ceiling constraints; weather; customer material; planning unfunded work;
- e. monitoring funding limitations.

39. Please use the space below and a separate sheet of paper, if you care to make additional comments.

N/A

Material Division Head (Code 450) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg. LCDR, CEC, USN.

Instructions: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. How do you describe the specific work reports you receive?
Circle as appropriate.
 - they are okay - 4
 - too lengthy - 0
 - receive more than I need or use - 1
 - should be more concise - 0
 - I could use better information - 1
 - I could use more reports - 0
 - they don't give me the information I need - 1
 - I don't use them - 1
2. Do you attend meetings which waste your time?
 - yes - 4
 - no - 4
3. Do the various meetings concerning specific work coordinate decisions and information?
 - yes - 7
 - no - 0
4. Does too much paperwork detract from your responsiveness?
 - yes - 5
 - no - 3

If yes, how can it be reduced? reduce hot jobs; eliminate manual reports; computer; better flow; stronger protection control;
eliminate redundancy/duplication.
5. Do P&Es normally specify shop store material rather than similar items not stocked?
 - yes - 7
 - no - 1

6. Do engineers normally specify material in shop stores rather than similar items not stocked?

yes - 5
no - 3

7. Do the P&Es and engineers know what material is normally stocked and available in shop stores?

yes - 8
no - 0

8. Are the material lead time estimates based upon information from suppliers or experience?

suppliers - 2
experience - 2

9. Does anyone compare material price estimates with actual prices to improve estimating?

yes - 4
no - 4

10. Who prices the material for job plans? equipment specialists (3); P&E (4); material coordinators

11. Do you know what your workload will be in future weeks?

yes - 2
no - 5

12. What actions do you take if workload exceeds targets or gets too large? overtime (8); reassignments/temporaries (5); shift workload.

13. Do you have many "not in stock" cases for items carried in shop store?

yes - 2
no - 6

14. Should the number of line items carried in shop stores be increased?

yes - 6
no - 1

15. Should the quantity of the line items carried in shop stores be increased to assure availability?

yes - 3
no - 4

16. Would a contractor operated shop stores for certain items improve your operation?

yes - 3
no - 5

17. Do you use inventory models (EOQ) for forecasting material needs?

yes - 2
no - 6

18. Who estimates the material lead time for the job plan?
equipment specialists (3); P&E (4); material coordinator.

19. Many people say that material is the biggest specific work response problem. Do you agree?

agree - 2

disagree - 5

Why? Disagree - one of many; longest; customer funding; over planning (2); time in PMS; backlog of jobs w/material; Agree - NSC, Oakland; supply middlemen; poor planning; long lead time.

20. What are the main obstacles to responsive material procurement?

poor specifications (2); poor sole source justification; grouping material for purchase; low purchase authority; personnel shortage; procurement time (4); NSC Oakland; infrequent demands; DAR; purchasing over PWC authority.

21. What can be done to improve material procurement response times?

increase purchase authority (2); better material specifications (2); change procurement regulations (2); more personnel; enforce shop use of and increase inventories; raise personnel grade levels; use IDTC (2); shorten lead times; response targets matched to market conditions; more DSA support.

22. What can be done to reduce or eliminate job starts slips due to material not on-board?

better planning; no job start w/o material; use DMI status reports; reschedule; procure material sooner; prioritize planned work; use realistic DMRs; level workload; buying obsolete equipment.

23. Please indicate below your response information for actual experience and goals. Use calendar days with 30 to a month.

	actual response (by priority)			response goals (by priority)		
	(A)	(1-2)	(3-4)	(A)	(1-2)	(3-4)
	top	high	routine	top	high	routine
material	—	—	—	—	—	—

24. On top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 2

no - 6

25. How can a responsive material lead time be accurately established so job starts don't slip? get adequate personnel; avoid grouping of materials; level workload; external problems uncontrollable; expedite outstanding orders; realistic DMRs; closer coordination; (based on past records); hold loading until material in transit.

26. Does job priority make a difference in material procurement?

yes - 4

no - 4

If no, why? priority inflation; material from planned jobs takes only
20% of total 450 effect.

27. Do your people follow-up on material status as a matter of routine or only by exception?

routine - 7

exception - 0

28. Are PWCs too optimistic in the response goals which have been set?

yes - 5

no - 3

29. How can your productivity be improved? computers (2); training; proper
forklifts; better spaces/layout (3); more authority; equipment inventory data;
improve CONUS support; decrease employee turnover; better stock control; make
450 department; better P&E material requirement determination; stop shop unplanned
material buys.

30. What types of actions have you taken to improve response? get more
authority; expand BPA coverage; work overtime; get more people (2); more phone lines;
increase stock items; expedite/followup outstanding orders (4); realistic DMRs;
fill vacancies; increase gross availability; analyze rejects; training; reorganize;
use IDTC; better warehouse equipment (3); personnel management; internal response
goals.

31. What do you think the top five problems are for specific work processing?

a. poor customer/PWC planning (4); unrealistic material demands (4); funding;

b. scheduling; material delivery (3); personnel availability; hot jobs;

c. authority; system circumvention; P&E backlog; poor facilities (2);

d. split responsibility for specifics; over control; invalid scheduling (2);

e. type of material requirements (2); too many unplanned buys (shops);

excess materials; CONUS supply; shop material problems.

32. If you so desire, please use the space below and a separate sheet of paper for any additional comments you may want to make.

poor equipment/facility inventory data.

Maintenance Department Head (Code 500) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg, LCDR, CEC, USN.

Instruction: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. How do you describe the specific work reports you receive?
Circle as appropriate.

- they are okay -2
- too lengthy -0
- receive more than I need or use -0
- should be more concise -2
- I could use better information -2
- I could use more reports -0
- they don't give me the information I need -0
- I don't use them -0

2. Do you attend meeting which waste your time?

- yes -3
- no -3

3. Do the various meetings concerning specific work coordinate decisions and information?

- yes -5
- no -1

4. Do customers complete their actions such as job signoff quickly and relative to job priority?

- yes -2
- no -4

5. Could rework be reduced with better planning?

- yes -6
- no -0

6. Is rework caused solely by shop personnel?

- yes -0
- no -6

If no, what are the other causes? P & Es; job plans(2); material (3);
customer interference; engineering(3); customer changes.

7. Please indicate to what degree of your personal time is consumed with customers and,

	none	some	alot	substantial
questions on job status	<u>1</u>	<u>4</u>	<u>1</u>	<u>0</u>
cost overruns	<u>1</u>	<u>4</u>	<u>1</u>	<u>0</u>
scope variance/amendments	<u>1</u>	<u>4</u>	<u>0</u>	<u>1</u>
job scope	<u>1</u>	<u>4</u>	<u>0</u>	<u>1</u>
quality complaints	<u>1</u>	<u>3</u>	<u>1</u>	<u>1</u>
response complaints	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>
requests to push jobs	<u>1</u>	<u>2</u>	<u>2</u>	<u>1</u>
priority increases	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>

8. What characterizes your feelings about field assistance from P&Es and engineers? Please circle the appropriate items for each row.

	never	sometimes	frequently
P&E	<u>0</u>	<u>3</u>	<u>3</u>
engineer	<u>1</u>	<u>5</u>	<u>0</u>
	help availability		
	get easily	takes some effort	hard to get
P&E	<u>1</u>	<u>3</u>	<u>2</u>
engineer	<u>1</u>	<u>1</u>	<u>4</u>

9. Do your people spend a lot of time of in-progress job variances?

a lot -3
 some -3
 hardly any -0

10. To what degree do the below items cause work stoppage?

	frequently	sometimes	hardly ever
field changes	<u>2</u>	<u>3</u>	<u>1</u>
unforeseen conditions	<u>1</u>	<u>5</u>	<u>0</u>
P&E error	<u>1</u>	<u>5</u>	<u>0</u>
material nonavailability	<u>4</u>	<u>2</u>	<u>0</u>
material no good	<u>2</u>	<u>3</u>	<u>1</u>
customer interference	<u>1</u>	<u>5</u>	<u>0</u>
manpower nonavailability	<u>0</u>	<u>4</u>	<u>2</u>
priority work	<u>1</u>	<u>3</u>	<u>2</u>
equipment nonavailability	<u>2</u>	<u>3</u>	<u>1</u>
design error	<u>0</u>	<u>5</u>	<u>1</u>
additional funding	<u>0</u>	<u>3</u>	<u>3</u>
other(specify) <u>Variances</u>	<u>1</u>	<u>0</u>	<u>0</u>
<u>worksite availability</u>	<u>0</u>	<u>1</u>	<u>0</u>

11. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes -1
 no -4
 should provide more -1

12. Does PWC overdesign work; that is provide more engineering than is necessary to get the job done?

yes -1
no -5

13. If you could, what would you change about the job scheduling process? let Maintenance Department control; better manhour allocation; schedule after material arrives; 350 not justified by product; reduce in progress time; scheduler produce task sequence sheets; computerize scheduling.

14. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes -2
no -4

15. In general, is it faster to accomplish specific work by contract or in-house?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>0</u>	<u>1</u>
in-house	<u>6</u>	<u>6</u>	<u>5</u>

16. Should more or less specific work be contracted?

more -0
less -5
okay now -1

If more or less, why? less-better quality; costs; do maintenance repair work in-house; in-house more beneficial to Navy; need workforce flexibility.

17. Does PWC contract the correct type of jobs?

yes -3
no -2

If no, please explain: contract any type of work; loose in-house capability.

18. Does PWC contract for the correct reasons?

yes -3
no -2

If no, please explain: contract has different job write-up; only to meet percentage

19. What are the bottlenecks in specific work processing?

Circle as appropriate.

fundable estimate -0
funding -1
engineering -2
job plan -2
material procurement -5

shop work -0
contract specifications -0
scope changes/amendments -4
other(specify) variances -1
getting temporaries - 1

20. Are there many job amendments after the job is started?

yes -5

no -1

21. Could the amendments have been resolved by P&Es, engineers, or the customer before the job start?

could have been resolved by the customer -0

could have been resolved by the P&Es -3

could have been resolved by the engineers -0

unforeseen -1

22. What is the lowest shop day backlog figure which will prevent the shops from running out of work and maintain a balanced trade mix? 90, 120, 150, 175, 250

23. What can be done to reduce or eliminate job start slips due to manpower nonavailability? streamline personnel system(2); use overtime; enforce priorities; better scheduling; larger workforce; better planning; contract low priority jobs; reduce hot jobs.

24. How accurate, estimated as compared to actual, are your specific work manpower availability projections? 80%; better than average; high percentage.

25. Are PWCs too optimistic in the response goals which have been set?

yes -4

no -2

If yes, why? can't be met; contractor competition; material purchase restrictions.

26. Many people say that material is the biggest response problem for specific work. Do you agree?

agree -5

disagree -1

Why? Agree - partly P&Es and MRIs; wrong materials(2); start job w/o material; long lead time.

27. What can be done to improve material response times? better P&E planning; revise procurement regulations; buy locally(3); stop buying nonstandard items; better shop stores; avoid NSD/MSC: (buyers not trade oriented), improve material receipt procedures.

28. For planning and contract decisions, should the specific work force be relatively stable throughout the year?

yes -4

no -1

29. What changes can be made to improve your response? reduce hot jobs; improve material response(2); better coordination/planning/scheduling(4); align workforce to meet workload; larger workforce(2).
30. How can your productivity be improved? improve job plan quality; better supervision; buy right material first time; modernize equipment/methods(3); utilize workforce-quicker material purchases-training; better planning; improve variance system; improve employee attitude.
31. What types of actions have you taken to improve response? establish project managers; use zone concept; improve supervision; shop personnel pick up materials; better equipment; align workforce; better transportation; radio controlled vehicles; push variances; more contracts; better planning; efficient crew sizes.
32. What do you think the top five problems are for specific work processing?
- poor job plans(2); material(5); scheduling(3); field
 - changes/variances(3); supervision(2); employee attitude;
 - work definition; manpower; reports; equipment/tools;
 - lack of young workers; transportation; P&E/Customer support;
 - engineering; funding; work accomplishment.
33. Since shop days is determined by the variable number of persons working specifics, is it a good backlog measure?
- yes -3
no -3
- If no, what would be a better measure? manhours per work center;
Why measure?
34. Do you feel you spend a lot of time "spinning your wheels"; that is doing things which the system should easily accommodate?
- yes -4
no -2
- If yes, what are those things? pushing hot jobs; supervising supervisors; getting material; variances; hiring personnel; system (i.e. PMS) implementation.
35. Do you have backlog goals other than the 150 shop days at the end of the third quarter?
- yes -3
no -3
- If yes, what are they? 6 mos; 60-90 days; 100 days
36. Please rank the PWC priority of effort relative to each type of work (1 is highest and 4 is lowest).

emergency-service	_____	1 - 1
minor	_____	2 - 0
recurring	_____	3 - 2
specific	_____	4 - 3

37. Circle the items which you feel apply to year end dump.

- results from poor customer planning -5
- causes delays in PWC response -3
- allows balancing the workforce throughout the year -1
- is not a problem, has no effect on response -1
- causes contracting problems -1
- no fault of the local customer -1
- causes faulty estimates and job variances -0
- gives extra work for PWC personnel -1

38. Please use the space below for any additional comments would like to make.

- workforce should be matched to workload
- determine expected workload with statistical procedures
- field changes are processed separately from original planning process; no continuity.

Specific Work Division Head (Code 510) Questionnaire

This questionnaire regarding specific work management is being distributed as part of a thesis study at the Naval Postgraduate School. You are requested to complete the questionnaire and expeditiously return it within 10 days in the preaddressed return envelope. Additional comments concerning specific work problems, improvements, and corrective actions are welcomed. If you desire a summary of the questionnaire results, please so indicate on the questionnaire. Your assistance in this undertaking is greatly appreciated. Thanks. J. G. Palmborg, LCDR, CEC, USN.

Instruction: This specific work questionnaire is designed to be answered by the designated PWC manager. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to your organizational element in general, unless otherwise noted. On multiple choice answers, please circle your answer(s). On written answers, please provide brief, concise, and to the point statements. If you need additional space, please use a separate sheet of paper.

1. How do you describe the specific work reports you receive?

Circle as appropriate.

- they are okay - 2
- too lengthy - 0
- receive more than I need or use - 0
- should be more concise - 0
- I could use better information - 2
- I could use more reports - 0
- they don't give me the information I need - 1
- I don't use them - 0

2. Do you attend meeting which waste your time?

- yes - 1
- no - 3

3. Do the various meetings concerning specific work coordinate decisions and information?

- yes - 4
- no - 0

4. Do customers complete their actions such as job signoff quickly and relative to job priority?

- yes - 1
- no - 2

5. Could rework be reduced with better planning?

- yes - 4
- no - 0

6. Is rework caused solely by shop personnel?

- yes - 0
- no - 3

If no, what are the other causes? P&E; customer; customer liaison; wrong material; job scope definition.

7. Please indicate to what degree of your personal time is consumed with customers and,

	none	some	alot	substantial
questions on job status	<u>0</u>	<u>3</u>	<u>0</u>	<u>0</u>
cost overruns	<u>0</u>	<u>2</u>	<u>1</u>	<u>0</u>
scope variance/amendments	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>
job scope	<u>1</u>	<u>2</u>	<u>0</u>	<u>1</u>
quality complaints	<u>0</u>	<u>3</u>	<u>0</u>	<u>1</u>
response complaints	<u>0</u>	<u>4</u>	<u>0</u>	<u>0</u>
requests to push jobs	<u>0</u>	<u>3</u>	<u>1</u>	<u>0</u>
priority increases	<u>0</u>	<u>1</u>	<u>3</u>	<u>0</u>

8. What characterizes your feelings about field assistance from P&Es and engineers? Please circle the appropriate items for each row.

	never	sometimes	frequently
P&E	<u>1</u>	<u>2</u>	<u>1</u>
engineer	<u>1</u>	<u>3</u>	<u>0</u>
	help availability		
P&E	<u>2</u>	<u>2</u>	<u>0</u>
engineer	<u>1</u>	<u>2</u>	<u>1</u>

9. Do your people spend a lot of time of in-progress job variances?

a lot - 2
some - 2
hardly any - 0

10. To what degree do the below items cause work stoppage?

	frequently	sometimes	hardly ever
field changes	<u>0</u>	<u>4</u>	<u>0</u>
unforeseen conditions	<u>2</u>	<u>2</u>	<u>0</u>
P&E error	<u>0</u>	<u>4</u>	<u>0</u>
material nonavailability	<u>3</u>	<u>1</u>	<u>0</u>
material no good	<u>2</u>	<u>2</u>	<u>0</u>
customer interference	<u>0</u>	<u>4</u>	<u>0</u>
manpower nonavailability	<u>0</u>	<u>4</u>	<u>0</u>
priority work	<u>1</u>	<u>2</u>	<u>1</u>
equipment nonavailability	<u>2</u>	<u>1</u>	<u>1</u>
design error	<u>0</u>	<u>3</u>	<u>1</u>
additional funding	<u>0</u>	<u>2</u>	<u>2</u>
other(specify) _____	<u>0</u>	<u>0</u>	<u>0</u>

11. Does PWC overplan work; that is provide more job plan detail than is necessary to get the job done?

yes - 0
no - 0
should provide more - 4

12. Does PWC overdesign work; that is provide more engineering than is necessary to get the job done?

yes - 0
no - 4

13. If you could, what would you change about the job scheduling process? needs complete revision; more problems now than previously; none.

14. For top priority jobs, is PWC responsive only when the procedural system is bypassed or short circuited?

yes - 2
no - 2

15. In general, is it faster to accomplish specific work by contract or in-house?

	<u>top priority(A)</u>	<u>high priority(1-2)</u>	<u>routine(3-4)</u>
contract	<u>0</u>	<u>0</u>	<u>1</u>
in-house	<u>4</u>	<u>4</u>	<u>3</u>

16. Should more or less specific work be contracted?

more - 0
less - 2
okay now - 2

If more or less, why? less - contractor inferior work; PWC out performs contractor.

17. Does PWC contract the correct type of jobs?

yes - 2
no - 2

If no, please explain: contract easy work; PWC gets messy jobs.

18. Does PWC contract for the correct reasons?

yes - 3
no - 1

If no, please explain: (none)

19. What are the bottlenecks in specific work processing?

Circle as appropriate.

fundable estimate - 1

funding - 0

engineering - 0

job plan - 1

material procurement - 3

shop work - 0

contract specifications - 0

scope changes/amendments - 3

other(specify) - 0

20. Are there many job amendments after the job is started?

yes - 4

no - 0

21. Could the amendments have been resolved by P&Es, engineers, or the customer before the job start?

could have been resolved by the customer - 0

could have been resolved by the P&Es - 2

could have been resolved by the engineers - 0

unforeseen - 2

22. What is the lowest shop day backlog figure which will prevent the shops from running out of work and maintain a balanced trade mix? 80; 90.

23. What can be done to reduce or eliminate job start slips due to manpower nonavailability? hire more people; don't over schedule; contract more; reduce hot jobs.

24. How accurate, estimated as compared to actual, are your specific work manpower availability projections? 80; 90; 70.

25. Are PWCs too optimistic in the response goals which have been set?

yes - 1

no - 3

If yes, why? scheduling system is too cumbersome.

26. Many people say that material is the biggest response problem for specific work. Do you agree?

agree - 4

disagree - 0

Why? long lead times (2); material substitutions; wrong sized material; material not available when needed.

27. What can be done to improve material response times?

purchase locally (2); more personnel; more purchase authority; stock more items.

28. For planning and contract decisions, should the specific work force be relatively stable throughout the year?

yes - 3

no - 1

29. What changes can be made to improve your response?
more manpower; better job plans; customer review job plans; material
availability scheduling; more vehicles; better planning/coordination in
production group; hire personnel faster.

30. How can your productivity be improved?
better supervision; align work force (span of control); less paperwork; new
equipment/work methods (2); better communication.

31. What types of actions have you taken to improve response?
increase field supervision; reject poor job plans; direct employee
job site reporting; more customer liaison, more contracts.

32. What do you think the top five problems are for specific work processing?

- a. material (4); transportation (3); scheduling (2); job
- b. plans (2); supervision; paperwork; hot jobs;
- c. customer liaison; estimating; hiring skilled
- d. personnel; disciplinary control.
- e. _____

33. What percentage of your journeymens time is nonproductive?
12; 15; 30

34. Is there much customer interference on the job site?
a lot - 0
a little - 4
not much - 0

35. Please use the space below for additional comments.
N/A

Administrative Sciences Curriculum
Naval Postgraduate School
Monterey, California

12 August 1980

Dear Staff Civil Engineer,

The attached questionnaire regarding PWC specific maintenance work (type work 60) is being distributed to all Staff Civil Engineers served by a PWC as part of a thesis study at the Naval Postgraduate School. This questionnaire is one part of the total effort of investigating the problems associated with specific work processing and workload management. The thesis will look at the problems, goals, perceptions, and management actions relative to specific work. The thrust is on the management approach to using the existing tools, and not to develop PMS III.

You are requested to fill out this questionnaire and return it in the self-addressed return envelope within one week. The questionnaire has been developed for quick responses and should take 10-15 minutes to complete. Additional comments are welcomed. Thank you for your assistance.

Sincerely,

J. G. PALMBORG
LCDR, CEC, USN

PWC Specific Work Questionnaire for SCEs

Instructions: This questionnaire is designed to be answered by the SCE personally. Please answer each question as indicated providing the best answer which matches your situation or thoughts. The "you" in this questionnaire refers to the SCE office in general, unless otherwise indicated. On multiple choice answers, please circle your answer(s). For written answers, please provide brief, concise, but to the point answers in the space provided.

1. How long have you been a SCE? _____
2. What is the size of your office? military _____
civilian _____
3. How much specific work do you fund to PWC each year (\$/yr)?
PWC in-house _____
Contract _____
Total _____
4. What percentage of your personal time is spent on specific work? 5 to 94%; mean = 20% _____
5. Please rank by priority (1 highest and 4 lowest), the relative importance of each PWC service to your command.
- | | | |
|-------------------|-------|--------|
| emergency-service | _____ | 1 - 4 |
| minor | _____ | 2 - 7 |
| recurring | _____ | 3 - 3 |
| specific work | _____ | 4 - 10 |
6. In general, would you rather have specific work accomplished by contract or in-house forces?
PWC in-house forces - 7
contract - 4
depends on circumstances - 14
7. What is(are) the reason(s) for the prior answer?
quality-better - 7
cost-cheaper - 7
response-faster - 11
coordination-more flexible - 13
depends on circumstances - 11
other (please specify) _____
8. Does PWC contract the correct types of jobs?
yes - 17
no - 7
If "no", please explain: contractors commercially available; (should do more); in-house takes all the jobs; contract too little.

9. Does PWC contract for the correct reasons?

yes - 18

no - 7

If "no", please explain: lack of customer coordination; only for workload and capability (2); (not economics); for ceiling constraints (2); decision sometimes appears nonobjective.

10. In general, is it faster to have work completed by contract or PWC in-house forces? For each type of job, specify contract or in-house.

	<u>Contract</u>	<u>PWC</u>
rush jobs (pri A)	3	20
high priority (pri 1-2)	10	13
routine jobs (pri 3-4)	16	7

11. Would you like to have more or less specific work contracted?

more - 10

less - 3

okay now - 11

Please explain your answer: more - reduce backlog (3); more routine work (2); cost effectiveness (2); coordination; inspection; reduce overhead; less time; fewer mistakes; less - more control; poor quality; responsiveness; depends on circumstances; engineering and specs makes contracting expensive and untimely.

12. Please indicate below what type of in-house response you receive on the average job. Also, please indicate what you think the response should be. Use calendar days with 30 days to the month.

	<u>response received</u> (by priority)			<u>response desired</u> (by priority)		
	<u>rush</u> (A)	<u>high</u> (1-2)	<u>routine</u> (3-4)	<u>rush</u> (A)	<u>high</u> (1-2)	<u>routine</u> (3-4)
fundable estimate	—	—	—	—	—	—
engineering	—	—	—	—	—	—
job plan	—	—	—	—	—	—
material procurement	—	—	—	—	—	—
shop accomplishment	—	—	—	—	—	—
total(without funding)	—	—	—	—	—	—

13. Is PWC responsive only when the procedural system is by-passed or short circuited?

yes - 14

no - 11

14. What are the bottlenecks in the specific work processing flow of work? Check as applicable.

fundable estimate - 8

funding - 2

engineering - 19

material procurement - 24

shop work - 4

contract specifications - 8

scope changes/amendments - 7

others (specify): backlog; paper shuffling; comptroller in workflow; equipment (2).

15. What five actions would you take to improve specific work processing? Please specify action and reason.

- a. material (all aspects)(8); engineering response (6); better job supervision/coordination (4); eliminate stop/go accomplishment (3); better work
- b. inputs (3); more customer liaison (3); increase material inventories (3); better reports (2); use BPAs (2); use sketches vice full design (2); project manage-
- c. ment (2); reduce schedule changes; lower backlog; change priority system (2); better estimates; shorter AE response; more sole source procurements;
- d. more pre-expended materials; improve contracting response: better contracting reports; reduce P&E field visits; use journeymen skill vice detailed job
- e. plan; decrease overhead; reduce report/management pressures.

16. Do you use the scoping estimate?

frequently - 9
sometimes - 5
hardly ever - 9

17. Can the scoping estimate be eliminated?

yes - 10
no - 14

18. Do you complete your actions such as funding and engineering design reviews,

always quickly - 4
usually quickly - 17
sometimes slow - 4

19. Do you change priorities to get work done sooner?

frequently - 3
sometimes - 21
never - 1

Even when the work does not warrant the priority increase?

yes - 6
no - 19

20. Do you provide complete job information on the work request?

always - 0
often - 15
sometimes - 1

21. How well do you know the PWC system so you can get the most out of it?

very well - 17
well - 8
alittle - 0
don't know - 0

22. Do you look for other accomplishment methods so you don't have to use PWC?

yes - 20
no - 5

23. How do you describe the specific work reports you receive from PWC?

- too much information - 2
- not enough information - 4
- not the correct information - 7
- just right now - 11

24. Do you call someone at PWC when you want job status rather than using the reports?

- yes - 17
- no - 7

Who do you call? (mainly code 350)

Why don't you use the reports? untimely (10); too general (4);

inaccurate (5).

25. Does PWC over-design jobs; that is provide more engineering than is needed to do the job?

- yes - 14
- no - 11

26. Does engineering take too long for the product produced?

- yes - 21
- no - 3

27. Should engineering be fixed price?

- yes - 14
- no - 8

28. Is engineering design responsive to your needs and/or the work request?

- responsive - 15
- not responsive - 9

If "not responsive", why? response too long (6); overdesign; code compliance; inaccurate; layout not design; large backlog; don't use available material.

29. Do P&Es make too many trips to the job site?

- yes - 4
- no - 20

30. Should PWC provide more assistance in:

- identifying work - 9
- developing job scope - 13
- developing maintenance schedules - 15

31. For whatever the reasons, do you make change to the work scope:

- frequently - 0
- sometimes - 23
- never - 1

32. Once the field work begins, the job progresses smoothly without problems or delays.

agree - 13

disagree - 12

If you "disagree", why? material (6); job plan (4); quality workman-
ship (3); schedule (2); PWC request for amendments; coordination.

33. Does PWC over-plan work; that is too much planning (job plan) for quality purposes at the expense of response?

yes - 10

no - 15

34. Does PWC take too long to produce the job plan?

yes - 16

no - 9

35. Additional comments: If you care to make additional comments, please do so below and on a separate sheet of paper.

- need more contracting to offset ceiling reductions.
- need equitable distribution of PWC effort to customers.
- PWCs should be staffed to workload.
- develop maintenance program to eliminate breakdown repair.
- eliminate fundable estimates for jobs with 100% sure funding.
- "PWC provides quality product - quickly (A), reasonably (1-2), too slowly (3-4)"
- improve engineering and estimating response.
- construction representative lacks authority.
- establish fast response specifics organization.
- need quality control system.

LIST OF FOOTNOTES

CHAPTER I

1. Public works services herein relate to those functional missions assigned to the U. S. Naval Facilities Engineering Command (NAVFACENGCOM) and are not based solely on the private sector definition of the term.

2. A third type has recently taken form; that is, a base operating services contract at the Naval Submarine Base, Bangor, Washington.

3. PWC, San Diego uses 100 manhours as the lower limit for specific work.

CHAPTER II

4. The NAVFACENGCOM Engineering Field Divisions are sub-organizational units located throughout the U.S., with the basic mission to assist local activities within a specified geographical area in all facility related matters.

5. The PWD requires support from other activity departments such as civilian personnel, supply, security and administration. During a consolidation, these non-PWD functions must be identified, quantified, and are usually included in the transfer of resources.

6. The term as-built drawings refers to the final correct set of drawings retained for record purposes after construction or improvement of a facility.

7. The breakpoint for no-fee engineering services is \$10,000. Above that amount, the customer pays for all engineering service.

8. PWC, Yokosuka, Japan is the only PWC not employing the NIF system.

9. At any Naval installation there will be one host or landlord, and one or more tenant commands. The provision of common services and charges therefore are determined in a host-tenant agreement. PWCs are not hosts and have tenant relationships with their hosts.

10. NAVFACENGCOM and its PWCs operate as a corporation. To that end, the COs attend a Corporate Management Workshop every six months.

11. CONUS is an acronym for the Continental United States.
12. Pacific means the Pacific Ocean area which contains the PWCs at Guam, Subic Bay, and Yokosuka.
13. The local activity COs have funding restrictions on the amount of money they can obligate or spend for certain types of projects. For further information, see OPNAVINST 11010.20D.
14. Separate and different priorities have been established by the Naval Supply Systems Command (NAVSUPSYSCOM) for material procurement. For further information concerning these priorities, see the NAVSUP Manual, volume II.
15. DAR is soon to be revised and reissued as FAR, The Federal Acquisition Regulations. FAR will apply to all government agencies rather than just the Department of Defense.
16. U. S. Navy Funding documents which allow the transfer, obligation, and billing of charges for services rendered by others, vary for different circumstances. In-house specific work is funded on a Project Order, NAVCOMPT Form 2053. For additional information, see the NAVCOMPT Manual, volume II.

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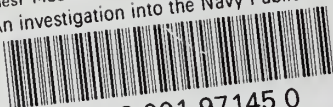
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